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ABSTRACT

This document reports on 14 innovative programs in the United States which promise to have the most effect on staffing patterns and teacher roles. The innovative practices are in three categories: a) differentiated staffing--horizontal and vertical; b) technology-dependent innovations; and c) open-learning plans. Among the conclusions drawn by the author are that a) reducing teacher/pupil ratio is neither the most effective nor the most economic method of increasing productivity; b) the incorporation of innovations into schools often causes unexpected changes in the goals of the innovator; c) many programmatic innovations are the first steps toward more effective staff utilization; d) when innovations are introduced, there is a tendency to hire new personnel rather than retrain the existing staff; and e) innovations tend to increase the number and complexity of instructional decisions on the part of teachers. The report suggests some implications for staff utilization policy and maintains that the most expeditious way of increasing productivity is to increase teacher effectiveness through the use of noncertified staff, improved middle-management concepts, and the use of instructional technology. (HMD)

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NEW PATTERNS OF TEACHER TASKS AND THEIR IMPLICATIONS

The effect of innovations on staffing patterns and teacher roles in the United States

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The attached document written by Anna L. Hyer and Robert M. McClure, Instruction and Professional Development - National Education Association (1) Washington (United States), is one of a series of reports prepared in the framework of the activity on the new concepts in staffing standards and requirements, under the Education Committee's programme of work.

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THE EFFECT OF INNOVATIONS ON STAFFING PATTERNS AND TEACHER ROLES: SOME CONCLUSIONS AND RECOMMENDATIONS

Paper Prepared for
Organisation for Economic Cooperation and Development

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*The views presented in this paper are entirely those of the authors and do not necessarily represent those of the Association.

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In this paper we will in three parts briefly describe the traditional school in the United States, spell out certain dimensions of fourteen selected innovative practices, and indicate our conclusions along with implications for policy. In addition, there is a bibliography and an appendices.

Part I: Description of the Traditional School

The majority of schools in the United States are organized on a graded, self-contained class basis. About two school systems in ten use some non-graded organizations. About four systems in ten use team teaching in the elementary school and four in ten in the secondary school. In the majority, however, one teacher with one group (class) of students for one year in a separate room is the usual pattern; hence, the "self-contained" classroom descriptor.

In the United States, schools (usually a number of elementary and secondary ones) are administered as a unit called a school system or a school district. Not all schools within a system necessarily use the same organizational patterns or staffing patterns. The school system furnishes specially trained personnel to provide support services to classroom teachers within the school system. There has been a significant increase within the last five years in the number and type of specialists employed. Common types are: guidance counselors, psychologists, remedial reading and math specialists, social workers, speech therapists, and the like.

Most of the schools are graded. This means that students are assigned when entering school to Grade 1 whether or not they have attended nursery school or kindergarden. The students progress from Grade 1 to Grade 2, etc., secondary school ending with Grade 12. Normally, one year is spent in each grade. Probably, the majority of elementary schools operate largely on a "non-fail" or age promotion basis rather than on rigid content standards covered by examinations. Length of the school year is governed by the state. By far, the greatest number operate on a nine-month, 180-day school year. The majority have a school year composed of two semesters. A voluntary summer session is common in school systems of large or medium size (over 3,000 students per school district). This means teachers are, for the most part, unemployed during three months of the year.

Elementary School

The mean number of students enrolled in 1973 was 591 per school and the mean number of educators (teachers and others) per school was 26. The mean class size was 27 pupils. It is common for pupils to arrive at 9:00 o'clock and to leave at 2:00 o'clock for younger students and at 3:00 o'clock for older ones. The

students are randomly assigned; that is, the groupings into classes is not on IQ or achievement bases unless some very serious problem exists in which case slightly less than half of the schools would arrange some special grouping. The teacher assigned his 27 pupils in a self-contained classroom environment has a considerable amount of freedom in the teaching strategies he may employ. He is restricted, of course, by such things as the general achievement expectations, the teaching materials available, the classroom facilities, and the attitude of school administrators and parents. Surprisingly, there is much less variation in teaching style from teacher to teacher than one would expect. Teachers tend to teach like the supervising teacher by whom they were tutored and are not, probably because of system expectations, very experimentally inclined.

Secondary School

The mean number of students enrolled in 1973 was 1,264 per school and the mean number of teachers per school was 63. Most secondary teachers teach five classes per day, comprising a total of 133 students. Secondary students commonly arrive at 9:00 o'clock and leave at 3:00 o'clock although there are many activities scheduled in the building at other hours, such as club meetings, athletic events, drammatic events, etc. In schools where many students are bussed, especially in rural areas, there are limitations on extra-curriculur activities because of decreased use of the school building for an extended day. Until recently, these extracurriculur activities supervised by teachers were considered a part of the teachers' assignment. Lately, there has been a trend toward either reducing the assignments during the regular school day for teachers so assigned or paying extra for the "overtime." The school day in the secondary school is commonly divided into six 50-minute periods. Students register for four academic subjects which usually meet daily for recitation, lectures, laboratory work, discussion, and receiving of assignments. The term "academic subject" as used here would include not only subjects such as literature, mathematics, science, and the like but also fine arts, business education, and other vocational education courses. In addition, students may take other courses such as physical education, music, or art which may not meet daily. This schedule means that the student has some unassigned time each day for study, library work, and the like. Most teachers have one period per day for student or parent conferences, class preparations, and the like. Because there is much freedom of choice of curriculum, there tends to be some "natural selection" and, therefore, the classes are not as heterogeneous as in the elementary school, especially in Grades 11 and 12.

Teachers are usually grouped into academic departments such as language arts, foreign language, math, science, etc. The

teachers at the secondary level, even more than at the elementary level, tend to operate individually in self-contained classroom units.

Staffing Patterns in Traditional Schools

We have seen that the mean class size in the elementary school is about 27 students per teacher and that of the secondary teacher is about the same -- about 27 students met in each of five different classes. The National Education Association of the United States with 1,400,000 members advocates lowering this pupil-teacher ratio on the premise that the result would be higher quality education and a workload for teachers more commensurate with productivity and efficiency. In most industry, a lower ratio than 27 to 1 in fact exists for managers and workers. Certainly, it has been pointed out, the role of the teacher working with immature persons, makes it even more critical to have an appropriate relationship of children to adults.

Research has not clearly shown a relationship between class size and educational results. There are many reasons for this. Several factors contribute to the quality of education, and it is difficult to isolate the effect of one single factor by holding all others constant. Also, there is the problem of establishing quality standards against which the effects of class size are to be measured. For example, one could argue that class size has little effect if the goal is retention of factual information and the method is lecture.

An interesting study was reported in 1971 by the Institute of Administrative Research at Teachers College, Columbia University, (3). They assessed with trained observers 20,000 classrooms using four criteria of quality: individualization, interpersonal regard, group activity, and creativity. The researchers found that, when measured against these indicators of quality education, there was a strong relationship between the class size and the score for that class. Quoting from the report: "There are three breaks at the elementary level that have reached the [illegible]ficant factors--when the class size drops from about 25 students [illegible] below 25; when it drops below 15 students and again when the class size drops to less than five students."

At the secondary level, the critical breaking points are 10 and 15 pupils per class. Teaching techniques changed as the class size changed. Some techniques achieved one or more of the four criteria better than others and those used in the large classes were the least effective ones. According to the study, it appears that the most economically efficient pupil-teacher ratio can only be established in relation to the desired goals.

The Rand Corporation conducted a study of outstanding Michigan schools in 1973 and found that the top Michigan schools had smaller class sizes, more teachers with five or more years of experience, and more teachers earning $11,000 or more annually. These results provided strong evidence that such schools were not statistical quirks.*

Tasks of Teachers

The teacher's "day" as we all know, is more than the time the teacher spends in class, face to face with students. One must, therefore, consider how the teachers spend their "teaching" time; that is, the 70% he spends on various teaching strategies. One must also consider time spent on other assigned responsibilities, both professional and non-professional.

The Institute of Administrative Research study referred to above has collected data concerning the percentage of time teachers spend in various teaching styles or techniques. The table below summarizes their findings. (3).

TABLE 1

Elementary and Secondary Observations
Scored by Style of Educational Activity

Style	Elementary	Secondary
Question/Answer	.16	.19
Discussion	.08	.11
Lecture	.02	.10
Small Group Work	.06	.04
Library Work	.01	--
Individual Work	.14	.14
Demonstration	.03	.04
Laboratory Work	.01	.05
Test	.03	.07
Movie	.02	.03
Television	.01	--
Other	.10	.09
Seat Work	.30	.11
Rehearsal	.01	.01
Pupil Report	.02	.02

Very few teachers have sufficient time during the "school day" to handle more than the face-to-face teaching, student conferences,

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*Reported In "Report on Education Research" Washington, D.C.: Capitol Pubs, Inc., July 4, 1973, p. 4.

and the necessary clerical and other non-professional aspects of their assignment. Teachers in the United States have been objecting to the increase in these non-professional chores.

After the school day is over, the teacher engages in instructional planning, selecting or producing teaching materials, grading papers, preparing examinations, parent conferencing, and from time to time in setting objectives and curriculum planning on a broader basis than for his own classes. The amount of time per week such activities consume depends on many factors such as the age of pupils and subjects taught, the experience of the teacher, school system standards and pressures, and the teacher's own professional standards.

Summary

As has been stated the majority of classrooms in the United States can be described as graded and self-contained, functioning under the leadership of one teacher. This is what in this paper will be referred to as the traditional school.

In most schools and classrooms instructional goals include acquiring the skills of literacy and computation; extending the ability to communicate; understanding and practice of citizenship; familiarity with the arts including experience with some form of artistic practice -- usually in vocal or instrumental music and art; achieving an historical perspective through the study of local, national, and world history and geography; understanding the fundamentals of science; becoming familiar with a variety of careers and, in some cases, competent in one of them because of the school program.

Such a description should not imply that all classrooms classified as traditional are alike in organization, methodology, or interpersonal relationships. Teachers are being taught how to use a variety of instructional strategies and how to match these strategies to objectives. This leads to more variance in the roles of teachers but it has little to do with staffing patterns and hence with the subject of this paper. The next section of the paper will deal with some innovative practices which either change the staffing pattern of a classroom or school or have potential for so doing.

Part II: Innovations Affecting Teacher Tasks

In this section we deal with innovations which appear to have an effect on teacher role and staffing patterns. Information about these innovative activities has come from the literature, including articles in journals and reports of research studies, through interviews with individuals associated with the various activities and through a questionnaire developed for the purpose of this study. It is shown as Appendix I.

Three categories of innovations have been somewhat arbitrarily developed. In the first, we discuss differentiated staffing and further divide that category into horizontal differentiated staffing and vertical differentiated staffing. We then describe several forms of technology-dependent instruction, and conclude Part II with four examples of what we have chosen to call open learning plans. Clearly, there is overlap among these categories; their primary usefulness is that they made our job of describing more manageable.

Differentiated Staffing

Staff differentiation in the public schools of the United States is not a new concept. The purposes and manner of implementation have undergone and are still undergoing change. The oldest model of differentiation was teacher/principal/superintendent with teachers being viewed more or less as interchangeable parts which performed like tasks for like pay. Departmentalization by subject areas offered a degree of specialization, but chiefly in terms of the content with which each teacher dealt. The adding of supervisors and specialists and, in about 1948, non-certified staff as teacher aides and assistants represented another type of differentiation. The roles were additive to the classroom teacher and did not result, to any degree, in differentiation of roles among teachers.

Team teaching was introduced in the mid 1950's. While affecting the way teaching is performed, it causes only occasionally different job descriptions or pay scales for teachers. In other words, in team teaching the differentiation is "horizontal" in nature -- different tasks but equal in value.

In the 1950s and 1960s, the National Association of Secondary School Principals started a series of staff utilization studies under the leadership of Lloyd Trump. By 1960, these had developed into an innovative strategy commonly known as the Trump Plan which promoted new ways of organizing students and teachers to accomplish the teaching/learning tasks. The thrust was to utilize variation in size of student groups depending on the nature of the learning task -- large groups, small groups, and independent study --

accompanied by flexible scheduling (variable time allotted per learning task). Today, NASSP is continuing its leadership in program refinement and implementation strategy in what is called the NASSP Model Schools Project involving 34 schools.

The innovative programs in team teaching, chiefly at the elementary level, and the NASSP models at the secondary level, have influenced hundreds of schools and also have prepared the way for more radical experimentation in staff utilization involving hierarchial or vertical differentiation of teaching staffs and a departure from the single salary schedule. The first such experiment in differentiated staffing was conducted in Temple City School District, California in 1968.

The U.S. Office of Education itself has funded 24 model projects which roughly meet this definition: "A teaching hierarchy with extensive vertical and horizontal differentiation of roles and with job responsibilities keyed to a differentiated pay scale." (11:8).

Supporters of differentiated staffing see in it possibilities of overcoming some current problems in education.

1. Teacher Role Dissatisfaction

As teachers' competency increases, there is no longer justification for instructional decisions being made by supervisors and administrators further removed from the clients and little better prepared to make the decisions. Teachers are demanding inclusion in instructional decision-making. Differentiated staffing provides a mechanism for accomplishing this.

2. Lack of a Career Ladder

Salary increases in the traditional school depend on years of service and number of college credits accumulated, not on the nature or quality of the services performed. Teachers who wish to advance in their profession must become supervisors or administrators. Good teachers should be able to earn as much as administrators while following a career as a classroom teacher. It is recommended, therefore, as a means of providing this ladder by many developing differentiated models, that salaries for some classroom teachers should be at least two times the level of the lowest classroom teachers' salary.

3. Cost Effectiveness

The input/output model of efficiency is being applied to the schools as educational costs increase. The educational

establishment's answer to quality improvement is to make the schools more labor-intensive by adding "more of same." Staff differentiation coupled with use of para-professionals provides a possible alternative to be tested.

4. More Humane and Individualized Instruction

Critics say that schools dispense lock-step education geared to middle class students who are print oriented and academically motivated. The students of the schools, as well, are becoming more varied in their social background, educational interests, and style of learning. Teachers, too, vary as to the kind of students and content with which they are most effective as well as finding themselves more successful with certain teaching styles than with others.

In the section following, four examples of horizontal and two of vertical differentiated staffing are described.

Horizontal Differentiated Staffing: "3 on 2" in Hawaii

In Hawaii, our only state with a single unified school district, the elementary schools were plagued with a double problem -- large classes of youngsters in contained classrooms and great heterogeneity caused primarily by differing language patterns. The solution created to solve the problem was the "3 on 2 Program." In this scheme, which is being incrementally implemented, three teachers assume responsibility of two groups of about 32 children each. In some situations there is an element of differentiation in that teachers with varying backgrounds are placed in the team of three so as to better match students and teachers. Advocates of the plan say that this approach is better than reducing the size of contained classrooms because it creates settings in which professional collegiality can grow and be beneficial to a specific group of learners.

The initial capital investment for the "3 on 2 Program" is not as high as might be expected because in most cases a single wall between two classrooms could be partially removed in order to create a double classroom from an existing "egg crate" building. The continuing costs are, of course, high because of decreased student/teacher ratios. There is evidence in improved standardized test scores that the program is justifying its costs.

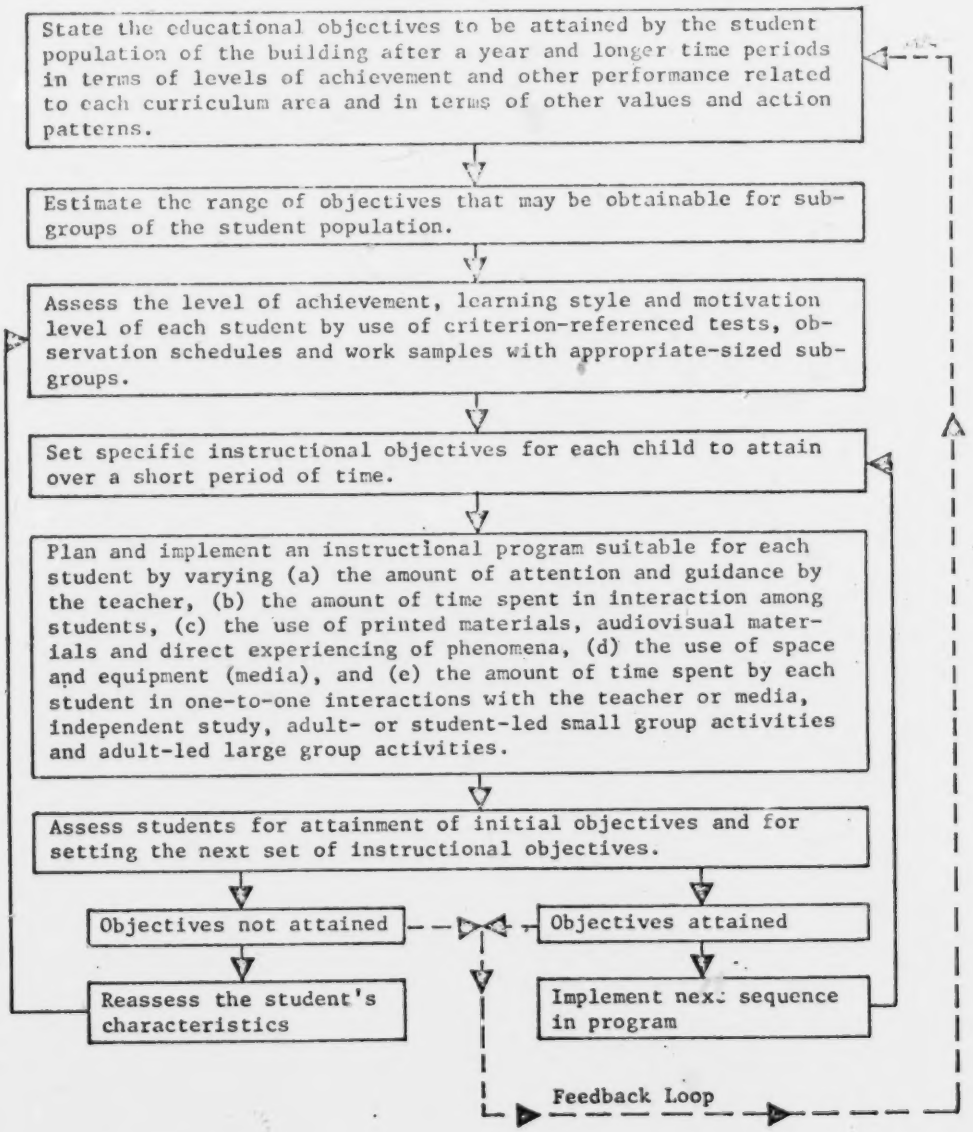
A second example concerns the various flexible scheduling enterprises where the overall pupil/teacher ratio remains the same but the ratio changes significantly given the task to be accomplished. There are few formalized expressions of this approach; there are scores of informal ones since all teachers in some way or another will vary the size of the group with which they are working because of the nature of the particular learning tasks at hand. At

the secondary level, the school will often have smaller classes in science classes, or in certain advanced math classes and larger ones in Physical Education or music. In the section of this report which deals with differentiated staffing and later in this section when we will touch on team teaching, attention is given to the more formal ways devised to change ratios depending on task.

Horizontal Differentiated Staffing: Individually Guided Education (IGE)

IGE is a comprehensive system of schooling at the elementary level. The system includes a model of instructional programming for individualized instruction, measurement devices and evaluation procedures, curriculum materials, a method to bring about productive home-school relationships, and a program to facilitate the adoption of IGE in the schools. This system can be visualized as follows:

INSTRUCTIONAL PROGRAMMING MODEL IN IGE*

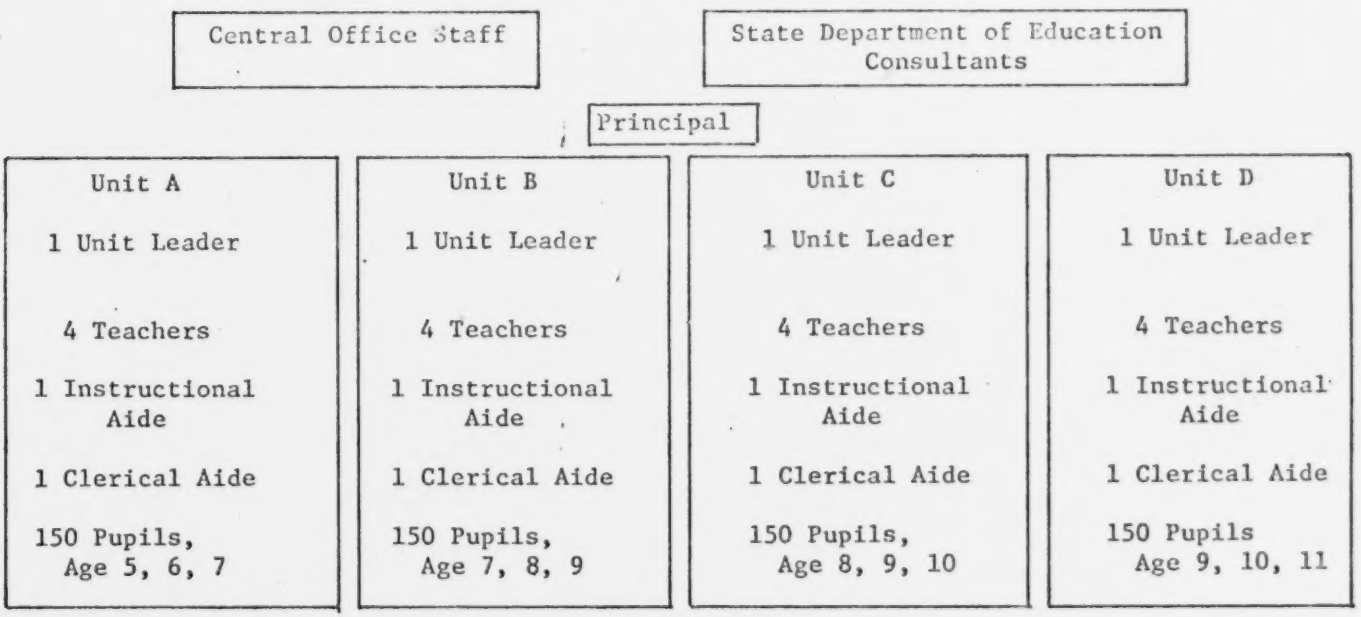

State the educational objectives to be attained by the student population of the building after a year and longer time periods in terms of levels of achievement and other performance related to each curriculum area and in terms of other values and action patterns.
Estimate the range of objectives that may be obtainable for subgroups of the student population.
Assess the level of achievement, learning style and motivation level of each student by use of criterion-referenced tests, observation schedules and work samples with appropriate-sized subgroups.
Set specific instructional objectives for each child to attain over a short period of time.
Plan and implement an instructional program suitable for each student by varying (a) the amount of attention and guidance by the teacher, (b) the amount of time spent in interaction among students, (c) the use of printed materials, audiovisual materials and direct experiencing of phenomena, (d) the use of space and equipment (media), and (e) the amount of time spent by each student in one-to-one interactions with the teacher or media, independent study, adult- or student-led small group activities and adult-led large group activities.
Assess students for attainment of initial objectives and for setting the next set of instructional objectives.
Objectives not attained
Objectives attained
Reassess the student's characteristics
Implement next sequence in program
Feedback Loop

*Next page.

IGE is being developed by the Wisconsin Research and Development Center for Cognitive Learning where much of the original research on learning, instruction, and individual difference continues to take place. (12). It is this research that shaped the program as it is now seen in more than 650 schools in 14 states.

The system is concerned with changing the organization for instruction, including the patterns of staffing so that instructional planning and implementation can occur. The IGE organizational arrangement in which the program occurs is called the multiunit school.

ORGANIZATION OF MULTIUNIT SCHOOL WITH 600 PUPILS**



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* Copied From Individually Guided Education and the Multiunit School, A Publication of the National School Public Relations Association, Washington, D.C.: The Association, 1972. p. 7.

** Copied From Individually Guided Education and the Multiunit School, A Publication of the National School Public Relations Association, Washington, D.C.: The Association, 1972. p. 8.

IGE's instructional materials are designed to support the multi-unit organization. Curriculur materials are already on the market or are being prepared in reading, motivation, mathematics, prereading, and environmental education.

Four tasks characterize IGE curriculum development work as it takes place in the preparation of materials or in the work of the building-based instructional improvement committees:

--Determining what is reasonable for children to learn within a given curriculur area;

--Which children need to learn what--assessment tools related to each curriculur area;

--Defining effective ways of teaching the skills or concepts to be learned;

--Determining ways of knowing what each child has learned.*

Initial per pupil costs for materials are about $10.00 higher than usual.

IGE has not identified a satisfactory procedure for relating costs and achievement. Generally, the multiunit organization is being run at the same or only slightly higher costs than traditional organizations. Evidence, based on eight years of research indicates equal or greater gains in achievement based on standard instruments and significant gains in such important characteristics as learner self-concept; attitudes toward peers, teachers, and other adults; school morale; vandalism to school property; and attitudes toward the community.

Horizontal Differentiated Staffing: NASSP Model Schools

The NASSP program has several basic goals including: creating and providing varied strategies and environments to match individual differences among learners and differences among teachers; to more sharply define teacher roles (as distinct from aides and others) and to cause the principal's role to be one of participant in instructional improvement work, leaving management functions to others; to sort out essential learnings for students and to reduce what is required thus allowing more opportunities for pursuit of student's own interests; and to develop better methods of evaluation.

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*Curriculum theorists will recognize these four tasks as similar to those proposed as basic to curriculum development work by Ralph W. Tyler in Basic Principles of Curriculum and Instruction, Chicago: University of Chicago Press, 1950.

Trump and Georgiades have described several characteristics of the program:

a. The principal spends three-fourths of his time working directly with teachers to improve instruction and learning.

b. Differentiated staffing and other arrangements produce changed roles for teachers.

1) Instruction Assistants (average of 20 hours per week per teacher) oversee pupils' independent study, etc.; Clerks (average of 10 hours per week per teacher) keep records, etc.; General Aides (average of 5 hours per week per teacher) perform tasks not requiring competence in subject areas or clerical skills.

2) Teachers are scheduled an average of not more than 10 hours per week with pupil groups (2 hours with large groups, 8 hours with small); the balance of 20 hours, mostly on school premises, are for keeping up-to-date, developing materials, evaluating, conferring, and supervising.

3) Most teachers serve a new role as teacher-counselor (helping about 35 pupils individually to plan, schedule, and change their independent study time and collecting information about each pupil's progress and difficulties).

4) Teachers work individually in offices or in groups organized by departments or on some other basis.

c. Individualized learning methods emphasize motivation, continuous progress, self-direction, individual scheduling, personalized evaluation, and attention to personal needs and interests, while maintaining pupil accountability.

d. Curriculum revision separates basic, essential learnings from other learnings that mainly are appropriate for pupils with special talents and interests.

e. Improvement of teaching and learning requires that money and facilities be utilized differently.

1) Financial input is analyzed in terms of gains (product output) in the foregoing items 'a,' 'b,' 'c,' and 'd' (principal's role, teaching roles, individualized learning, and curriculum

revision). Improvements in those areas do not necessarily cost more.

2) Most conventional classrooms become learning centers (both kinds: study and work) for independent study; a few rooms are divided for small-group meetings and for teacher offices and workrooms; a few spaces are needed for large-group instruction (motivational presentations).

3) Priorities for new construction or for purchase of supplies and equipment are based on what will produce the most good for the most pupils, in terms of the goals of the teaching-learning methods in the Model.

f. Increased emphasis on evaluation is essential to provide feedback for directing further improvements, and to produce confidence in the changes. (10:109-118).

Clearly, new teacher roles are required in such a school program. In some schools these roles are acquired by reducing the scheduled class meetings per week in order to give teachers time for independent study and the development of materials for pupils' continuous progress. In others, teachers are helped to develop continuous progress materials for pupils to use, including adapting their current basic textbooks, the development of "guidesheets" that help students to become more independent, and the preparation by the staff of a learning package so that they become familiar with more sophisticated self-directing, self-motivating, self-pacing materials for pupils. Also, teachers are helped to improve their methods in conventional classrooms by helping teachers to reduce the amount of time that they talk to the entire class (hopefully, not more than 20%). In contentional settings, attempts are made to increase the quantity and improve the quality of independent study periods. In these periods, the emphasis is less or credit material and more on audio and visual materials. In many classrooms, instead of the conventional, and practically useless, "recitation" or total-class discussion, classes are being divided into groups for discussion purposes or for "buzz sessions." Pupils are being helped by teachers in these conventional classrooms to learn how to discuss and to learn better how to relate to each other.

Trump and Georgiades propose several new ways to use facilities and money:

1. Reduce overcrowding by introducing more independent study, large-group instruction (presentations), and small-group discussion.

a) Remove a wall between two classrooms and substitute chairs for school desks (arranged in semi-circular fashion to face the presenter now stationed in the front, on the window side now covered by a curtain or green paint); this facility houses twice as many pupils as in conventional classrooms.

b) Install two partitions in a conventional classroom to produce 3 small-group discussion rooms, substituting chairs in a circle for school desks; this arrangement accommodates 50 percent more pupils in the same space.

c) Change classrooms into study and work centers for independent study; schedule more pupils for some supervised study and work in the community, with appropriate arrangements for accountability.

d) Convert corridor, lobby, and cafeteria spaces into independent study areas; pupils can walk through such areas while other pupils are working, especially under flexible and individualized schedule arrangements.

2. Make better use of the potential talents of the professional staff:

a) When a teacher retires or leaves, use the salary to employ clerks, instruction assistants, and general aides.

b) Gradually increase the number of qualified adults that serve the pupils while reducing the number of certificated teachers, at the same time increasing the time that teachers have free from scheduled classes of pupils. (10:118-119).

An analysis of the model plan makes clear two important points. The basic interest is not in saving money. (The article from which the above was quoted is titled "Doing Better With What You Have"! Trump admits that in the early steps of implementation, costs are frequently higher because of expenditures for such items as building remodeling. Most schools, however, can function within the normal financial support base even though a few do spend more for basic supplies, salaries for non-certificated support personnel, and for audio-visual materials and equipment.

Secondly, it is evident that no mention is made of hierarchies of teachers or pay differential except between certified and non-

certified staff. Some hint of long-range implications are inherent in the following suggestions for analyzing the present school situation:

1. In view of the fact that many studies now indicate that teachers generally are more concerned about working conditions than about higher salaries, how much work are teachers doing now that could be done by less costly clerks?

2. How much work are teachers doing now that could be done by part-time instruction assistants, i.e., persons with some training in the subject field or grade level of the teacher, but not necessarily as much training as required for certification as a teacher? (Examples of such persons are housewives, college students, and retired teachers.)

3. What are teachers doing now for students that students could do for themselves -- if the students had the time, the places, and the materials for independent study? (Such an arrangement can save teacher time and energy while giving students more experience in "learning by doing" and "responsibility for their own learning"--both desirable educational goals.)

4. Have the techniques of job analysis been applied to the teaching group in order to discover what teachers must do and what may be done more economically and efficiently by less costly other persons and/or machines? (10:119-120).

Vertical Differentiated Staffing: Temple City (California) Model

The Temple City Model was built around a hierarchial staff differentiation concept. Dwight Allen, a key architect of the plan, made two basic assumptions. First, that a variety of teaching roles, based on task analysis, would result in more effective staff utilization; and secondly, that the career ladder concept would be an incentive to teachers to remain in the profession and more particularly to remain in classroom teaching.

Table 2 shows the plan of differentiation which was in use in Temple City in 1969-1971. (30:79).

TABLE 2

Temple City Differentiated Staffing Plan
1969-71 (Model 3)

			Nontenure MASTER TEACHER Doctorate or equivalent
		Nontenure SENIOR TEACHER M.A. or equivalent	
	Tenure STAFF TEACHER B.A. and Calif. Credential		
Tenure ASSOCIATE TEACHER B.A. or Intern			
100% teaching responsibilities	100% teaching responsibilities	3/5's staff teaching responsibilities	2/5's staff teaching responsibilities
10 Months $6,500-9,000	10 Months $7,500-11,000	10-11 Months $14,500-17,500	12 Months $15,613-25,000
INSTRUCTIONAL AIDE II $5,000-7,500			
INSTRUCTIONAL AIDE I $4,000-7,500			
CLERKS $5,000-7,500			

Several problems still remain unsolved in the Temple City Model plan:

1. Some teachers, especially the older ones, feel their status and prestige has been reduced.

2. Differentiated staffing did not necessarily result in differentiated instruction.

3. New teaching roles rend to be covered by adding new positions rather than by redistributing tasks to available staff.

4. The hierarchial structure tends to become more rigid rather than more flexible as time goes on.

Those closely related to the Temple City work have concluded that a major achievement has been the active involvement of teachers in the decision-making process.

Vertical Differentiated Staffing: Mesa (Arizona) Model

While the Temple City model was based on a new organizational pattern or structure of staffing, the Mesa, Arizona plan is

based on a process model from which staffing patterns can emerge. The Mesa Model is based on these ideas:

(1) New teaching functions or roles should be based on needs assessment of learners.

(2) No permanent hierarchy of teacher roles should be established; the roles should shift as student needs shift.

(3) Differential pay is of secondary importance.

(4) Emphasis on "output" (student results) is more important than on "input."

James Zaharis describes the goals and objectives in this way:

General Goal: To specifically improve pupil performance of the Mesa Public Schools' program.

The Mission: To develop a more flexible and responsive staff deployment model.

The Desired Objectives

1. A new staffing model which

   a. Is client-centered (roles are based on defined student objectives and centered on tasks to be accomplished from defined student needs);

   b. Creates a model in which roles are fluid (that can be changed in relationship to one another as the tasks change and student needs change);

   c. Fosters a humanistic school climate conducive to learning;

   d. Promotes a shift from teaching per se, to the management of learning;

   e. Provides a means whereby teachers can develop a career in teaching as in other professions and be paid commensurate with what they may earn as administrators if promoted;

   f. Provides a criterion of teacher salary which reflects responsibility and performance of students rather than solely time served or units accrued.

2. A system of accountability is developed whereby all those responsible to the public for the education of children may be related to the growth and development of the student (the client);

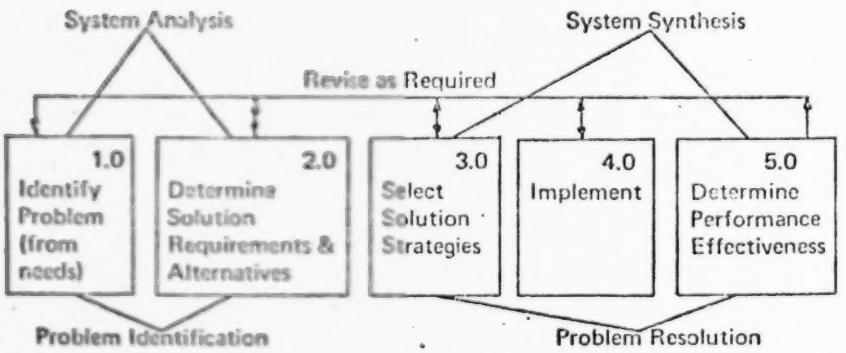
a. Performance outcomes expected of students (and values, ...) are defined as baseline criteria for the schools;

b. A system of contracting is developed whereby the professional staff is accountable for the expenditure of an agreed upon number of resources to educate children in a specific way and which will include personnel, time, materials and related sub-contracted services desired. (30:268).

The process revolves around a six-step problem-solving model.

TABLE 3 (30:280)

Six Step System Problem Solving Model



The Mesa Project requires school staffs to submit "bids" to the Board of Education for achieving specific outcomes. The "bids," or internal performance contracts, relate objectives to real resources such as staff, materials, and travel. The assumption is that if teachers are to be held accountable, they must be able to control the resources for accomplishing objectives.

Teacher pay is governed by a base commission with the provision for increasing the baseline figure by (a) accepting responsibilities and (b) being paid additional on the performance

delivered. A hierarchy of roles is built as student needs indicate, and the roles are temporary; that is, the hierarchies are abolished when the objectives are met.

In Conclusion

From the two examples of vertical differentiated staffing briefly described, it is obvious that the models vary greatly in the assumptions and theoretical constructs upon which they are based and that this in turn results in very different types of models. It should be understood, also, that these described are only two of numerous models now being tested.

Fenwick English, in a recent book (30:104) provides this comparison of three models of differentiated staffing, the two described above and a third one:

TABLE 4

Tentative List of the Characteristics of Three Differentiated Staffing Models on Ten Basic Continuums of Project Development

CONTINUUM	TEMPLE CITY, CA	SARASOTA, FLA.	MESA, ARIZONA
1. Hierarchy of roles	fixed-static	semistatic	fluid; shifting; impermanent
2. Degree of teacher-centeredness	almost wholly teacher centered	semi-teacher centered	student needs form basis for task analysis and role development;
3. Basis of role structure	analysis of teacher tasks	analysis of teacher tasks	learning objectives for pupils;
4. Model site (school) specificity	very little model site adaptability	units are interchangeable or equated	wholly site specific
5. Salary structure	fixed/hierarchical and parallels administrative career ladder	semihierarchical	salary base plus (+) role contribution during "bid" period;
6. Utilization of output as feedback to change model of DS degree of closed-loop provisions;	roles and role numbers are not dependent upon feedback (student) utilization	not a planned part of model, but adaptable	dependent upon feedback on pupils from performance contract to contract
7. Role of pupil objectives in model	ancillary	generalized pupil tasks form role base	dependent upon pupil objectives based on needs assessment;
8. Curriculum focus	disciplined centered or subject matter centered	same as Temple City	product centered within and across existing disciplines
9. Evaluative criteria	means centered/incidental data gathered	means centered	criterion and product centered
10. Model priorities and "mix"	(a) structural change; (b) people; (c) curriculum (d) outcomes;	(a) structural (b) curriculum (c) people (d) outcomes	(a) outcome centered; (b) people centered; (c) curriculum centered (d) structural change

An evaluation of eighteen differentiated staffing programs was conducted in 1971 (30:343-361) covering 976 educators

geographically spread throughout the United States. 94% were in USOE funded projects dealing with differentiated staffing. An evaluation model was developed which defined the concept and delineated components: Individualism (personal fulfillment); Collegiality (interpersonal interaction); Professional Disposition or Commitments; Work Flow Structures (decision-making, communications, etc.); Perpetuation Structure (recruitment, employment, training, and reward system); Systems Self-Renewal (needs assessment, philosophical bases, etc); and accountability (monitoring achievement). The study collected some interesting information, particularly about teacher tasks:

(1) Personnel viewed as most important and were most in agreement with elements covered under "perpetuation structure"; collegiality was viewed as almost as important; accountability also received high marks.

(2) The planning committee of all eighteen projects listed as a goal "making effective use of available resources within the existing staff structure by providing teachers with adequate non-professional help." Other goals listed by 2/3 or more of the project planning committee were:

a. Differentiating staff responsibilities based on a breakdown of educational and instructional tasks.

b. Providing each child with learning resources appropriate to his individual needs.

c. Relating differentiated responsibilities to salary differentials.

d. Providing continuous and relevant in-service training based on instructional objectives established by the staff.

e. Insuring that decisions are influenced by individuals who will be called upon to implement them.

f. Increasing the staff's professional commitment to the student.

g. Improving interpersonal relations skills in the schools.

(3) The projects agreed that they have only begun to attain the goals they consider important.

(4) Expectations from the community, school boards, etc. are too high in the early stages of experimentation.

(5) It is not known yet whether students will learn more under flexible staffing, but the indications so far are that they will not learn less.

(6) Teachers who have been a part of differentiated staffing tend to be convinced by the rationale of flexible staffing although only 74% wish to work in a school with such staffing and differentiated planning and direction of classroom instruction. (30:351-352).

Differentiated staffing does not guarantee greater economic efficiency; in fact, it tends to be more expensive in the beginning chiefly because of staff training costs and the need to remodel physical facilities. Also, the tendency is to accommodate the new staffing plan to existing salaries and staffing structures rather than to substitute immediately ones that might be more cost effective.

Technology Dependent Innovations

The use of audio-visual materials occurs or may occur in all the innovations previously discussed. However, they were not media or technologically dependent; that is, if the use of the audio-visual materials was removed, the instructional system would not break down. In this section, innovations will be discussed that are dependent on one or more media or on a technological system.

The term "media" is used to refer to those materials and devices used in the processes of teaching and/or learning. The term "instructional technology" is defined as a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives and employing a combination of human and non-human resources. "Process" is an essential element of technology, but not of audio-visual materials.

There have been a fairly large number of studies comparing the use of instructional television, programmed instruction, computer-assisted instruction, film courses, and the like with conventional instruction. The research shows fairly

conclusively that, when used for suitable instructional tasks, there is no significant difference between conventional and the mediated forms of instruction.

If tasks of human teachers can be differentiated so that some teachers perform some roles and others different roles, and teacher aides still others, then it is only a small step to the sorting out of roles that are appropriate for non-human resources. Experimentation with this type of differentiated staffing has been slower than the experimentation with human resources partly because of the tremendous expense in the production of the instructional materials. There are also problems of teacher attitude and teacher training.

In this section, three categories of technology-dependent instruction will be discussed and cases sited: Intensive use of a single medium -- closed circuit television and computer-assisted instruction; multi-media usage; and an instructional system with minimal use of audio-visual.

Closed-Circuit Television - Washington County, Maryland

Washington County, Maryland has completed seventeen years of continuous use of classroom television. The County covers 468 square miles and contains forty-five schools and a junior college. The schools are linked by coaxial cable to form a closed-circuit television network. Six lessons can be sent simultaneously. Many classrooms are equipped with two twenty-one inch television sets. There is also some use of large-group viewing of televised lessons. Such areas are equipped with several sets or with large screens.

Televised lessons are used at all grade levels, although not in all subjects. Elementary pupils spend as much as 13% of their classroom time watching television lessons which vary in length from thirteen to twenty-five minutes. Junior high school pupils spend almost one-third of their time in televised lessons, but high school pupils seldom spend more than 10% of their time.

The studio and classroom teachers form a team. Both are involved in planning the televised lessons and in the evaluation of them. They are paid according to the same scale, and studio teachers are chosen from the regular County teaching staff on the basis of experience and ability. The television teacher is relieved of all classroom routine, so that he has time to plan his lessons with care and ingenuity, develop needed instructional materials, and keep them up to date in a way that the classroom teacher cannot.

A televised lesson, however, cannot meet individual differences, so the classroom teacher using a teacher's guide plus his own ingenuity, follows up the televised lessons in ways to meet the needs of the individual students. Other audio-visual materials may be used by the classroom teacher; for example, to follow up the conversational French taught through television from Grades 3 to 8, there are available tapes, recordings, and supporting visual materials. Washington County schools have a fairly extensive educational resource center to supply such items as slides, art reproductions, tapes, records, photographs, and other instructional aids.

After the introduction of television, there was a noticeable gain in student achievement in most subjects taught. This was true regardless of grade, subject, range of ability, or class size. The Washington County staff does not claim that television was solely responsible for the improvement, but they do feel that it contributed to the overall situation which made the achievement possible.

Per pupil expenditures in the County including the cost of television instruction compare favorably with those in the rest of the United States. A report issued after the first five years of the experiment stated:

> The redeployment of personnel and equipment made possible by television has produced savings which cover the annual operating costs, and in terms of duplicating in conventional classrooms what is now offered on television, the County's savings are substantial. Without television, the County would require more than 100 additional teachers and a budget increase of almost $1,000,000 to duplicate the courses that have been added to the instructional program. This is more than three times the annual operating cost of the television network. For example, without television, it would cost more than $250,000 annually to provide art and music specialists for the elementary schools. (15:2).

The redeployment of personnel referred to is related to the large group television viewing mode in use in junior and senior high schools. One example is cited:

> ....a junior high school teacher formerly taught five sections of thirty pupils--150 pupils--every school day. This same teacher might now have during the first period of each school day, 120 pupils (or four sections of thirty) in an auditorium

> for a large-group television lesson. During the remainder of the day he might meet each of these four sections, one by one, for classroom work. Thus, at the end of the school day, the teacher has, in effect, taught eight sections, whereas before he taught five; and yet his work load is lighter, because he grades and keeps records on only 120 pupils instead of 150. Television thus makes this teacher the equivalent of one and three-fifths "pre-television" teachers. (19:19).

Computer-Assisted Instruction

CAI is another promising type of technology with which we in the United States have been experimenting over the past decade. With the availability of more computer programs, more experience in the development of software, and the lowering cost of the hardware, the use of CAI, especially of the drill-and-practice type, has spread from rural schools in Mississippi to large city school systems. Probably the most extensive use of CAI is with the Stanford University drill-and-practice type program in elementary arithematic, which in 1973 reached 19,000 students. Because the work of Suppes has been long-term in nature and intensive in character, it seems appropriate to explore the Stanford University experience before citing specific school experiences.

Stanford University Computer-Assisted Instruction Experiments:

Patrick Suppes and staff at Stanford University have had ten years of experience with computer-assisted instruction. (23). The first program developed was an elementary mathematical logic which was closely followed by the arithematic drill-and-practice program. During the ten-year period, these programs have undergone continuous refinement, the number of students involved has been greatly expanded, and new subject areas have been covered. There has also been some experimentation with some courses where the total instruction was via computer.

The display device in use consists of a cathode-ray tube, commonly called a "scope." It can display points of light in an area 10 inches high by 10 inches wide with 1,024 possible positions on both the horizontal and vertical axes. In addition, 120 characters may be displayed in five different sizes. It is also possible to display vectors by identifying the end points. A typewriter keyboard is attached to the scope and may be used to send information from the student to the computer. There is much reliance on simple, inexpensive equipment. For example, teletypes are considered ideal for both experimental and catagogical purposes since young children can operate them easily. To the teletype, if

required, can be added a headphone jack with a small gain amplifier that can convey vocabulary of some 5,000 words. With this type of equipment, which is used in the Stanford reading program, the cost of a daily twelve-minute lesson per student is about forty cents.

In 1966-67, courses were developed on symbolic logic and modern algebra. These were self-contained, tutorial, computer-assisted instruction given at a teletype terminal. Very little group instruction occurred, but students were able to ask questions of a staff member who was available in the teletype room. The following year, elementary Russian was introduced again as a self-contained CAI program. Later, a second year computer-based Russian course was added. Still later, a remedial mathematics course for college students and a tutorial program in computer programming was added.

In 1968, a CAI program in reading to be used by children in Kindergarten through Grade 3 was introduced as an adjunct to classroom instruction. It stressed the decoding aspect of reading. The CAI lessons were twelve minutes in length, although one experimental group used programs up to thirty-six minutes per day, and the rate of progress per hour was equivalent to that of the groups using three twelve-minute sessions indicating that young children did not lose interest in the task during the longer periods. 70% of the teachers in the experimental group said that their children interacted well with the program and that they did not feel isloated or neglected by the teacher.

One of the aspects of the investigation of the Stanford University Project had to do with the feasibility of teaching mathematics and reading as an integral part of an elementary school program over an extended period of time. In carrying out this experiment, teletypes were used in some schools as far as 2,000 miles from Stanford University. In other cases, the connection to the Institute's computer was by ordinary telephone line.

In the beginning, the Stanford CAI programs were developed to be used in schools organized on the self-contained classroom basis. In 1968, experiments started with revising the drill-and-practice program in arithematic so as to be more useful in a continuous non-graded individualized school program. Suppes explains this transition as follows:

> The question used to determine what types of problems a child should receive on a drill changed from 'What grade is the child in?' and 'What is usually taught at that grade level?' to 'What concepts has this child mastered?' and 'What should this child learn next?'

> Attention to the child rather than to the classroom resulted in a reorganization of the drill-and-practice material in elementary-school mathematics into ungraded strands. The student, working on several strands simultaneously, begins at the bottom of a strand and moves upward on each strand as a function of his ability to perform correctly on that strand. Since movement along a strand depends on the student, the level of performance on other strands creates a problem set for one student different from the problem set for another student. Thus, unlike in the traditional classroom, each student is solving a different set of problems, and each set of problems contains problem types from each strand appropriate to the ability level of the student involved. (23:26).

Montgomery County Public Schools, Maryland:

Montgomery County is a suburban area near Washington, D. C. of 500 square miles with 197 schools and a student population of 128,000. In 1958, with a U.S. Office of Education grant, they started Research into Feasibility of Learnings Employing Computer Technology (Project REFLECT). The project now involves 1,400 students in one elmentary, one junior high school, and one senior high school. Subject areas include mathematics, industrial arts, history, French, reading, English, science, and teacher education.

Objectives of the project are:

(a) Identification, within the K-12 curriculum design, of instructional elements appropriate for implementation by CAI;

(b) Assessment of the applicability of CAI materials produced outside the schools for implementing the program of instruction of the school system;

(c) Production of a limited number of "modular instructional packages" for use in CAI set-up, programmed for flexibility in mode of presentation to meet the needs of individual learners within the overall curriculum design of the schools;

(d) Actual participation by students in the use of CAI equipment and materials as part of the curriculum;

(e) Determination of the feasibility of using CAI facilities for testing and test development;

(f) Determination of relative efficiency and effectiveness of CAI in the learning process; and

(g) Determination of the use of CAI in diagnosing the developmental status of learners and their needs. (25).

The June, 1971 report succinctly describes the nature of the project:

> "Modular instructional packages, consisting of computer-assisted instruction programs with associated equipment and materials for experiences leading to the attainment of specific behavioral objectives, are basically of a single concept type. No attempt has been made to develop entire units or courses or to fill specific time allocations. Segments designed employ a variety of the presently known CAI techniques of drill and practice, simulation, remote computing, testing, tutorial dialogue, and combinations of these. Some segments include attempts to extend these techniques and develop new ones. Modular instructional packages with strategies for various student target populations, including some which feature learner control of sequence and duration, have been developed. Data collected from the use of validated segments is being used in identification of the role of computer-assisted instruction in an individualized learning system." (25:19).

Storage units, input-output devices, a central control complex, and a station control are used with student stations in the IBM 1500 Instructional System employed in Project REFLECT. Students use instructional stations connected by cable to the computer and its peripheral equipment. Instructional terminals, as the student stations are called, consist of one or more of these components: instructional display with keyboard and light pen, image projector, audio equipment, and typewriter unit.

Experienced classroom teachers develop and adapt materials for use in the CAI project. Teachers involved in the project are provided with staff development opportunities. A team usually consists of a teacher specialist and a number of supporting teachers who devote 10% of their time to the CAI project and the rest to regular classroom teaching. Specialized personnel such as programmers are employed to convert the authored materials into machine-useable form.

In the Montgomery County experiment, CAI is considered but one component of a more comprehensive individualized multi-media learning system design. Teachers involved in the experiment have found that their role changes. They tend to depend upon the computer to provide diagnosis, drills, and tutorial materials and to aid them in monitoring student progress. Teachers are also relieved of diagnostic and criterion reference testing and grading and much record-keeping. In mathematics, the teachers are also relieved of much

of the time previously required to write problems and grade practice work.

Because CAI is "additive" in Montgomery County, it tends to increase the cost of instruction. The Project Managers estimate that, if students used the computer one-half hour per week, it would add approximately 10% to the per pupil cost of education. Because of this, they recommend that, even though CAI is effective, it should presently be used only when (1) increased achievement cannot be realized without it, (2) larger class sizes can offset some of the costs of computer hardware, or (3) no other method of providing the instruction is available.

Chicago, Illinois Public Schools:

In 1971, CAI was introduced into seven elementary schools in Chicago. By the fall of 1973, 26 schools were involved and the number will grow to 32 by February, 1974.

The purpose was not to replace teachers but to cope with a rising teacher/pupil ratio, to personalize instruction, and to extend teacher effectiveness. The first seven schools chosen were from the poorest economic areas of the city where reading achievement was one year below grade level or more.

Three curricula are currently in use: mathematics, grades 1-6; reading, 2-6; language arts, 3-7. The programs are adapted for the Chicago hardware from the materials developed by the Computer Curriculum Corporation of Palo Alto, California, a firm in which Professor Suppes has played a major role. The curriculua are organized in strands so that student needs can be met. The reading strands, for example, include word attack, vocabulary, literal comprehension, interpretative comprehension, and work study skills.

In the Chicago schools, there is a CAI room where the display terminals are used by students. A paraprofessional supervises the CAI room and instructs pupils in the operation of the terminals as needed. There are half as many of the terminals as there are students because each student uses a terminal 10 minutes per class period in two of the three curriculua or a total of 20 minutes. This is considered about maximum student endurance and in ten minutes a student gets five times as much practice as he would get using a textbook or workbook.

When a student sits down at a terminal, he simply types out his identification number, his last name, and the first letter of the curriculum from which he needs a lesson. The computer replies, on the screen, "Thank you, Johnny," using his first name

for verification and personalization. And the lesson begins The central computer instantly selects the proper starting place for the lesson--determined by the student's achievement level and needs, already in the computer's memory. Drill and practice is the method used. The computer makes assignments, checks the response for accuracy, evaluates the student's potential for the next sequence of complexity, and then assigns the next sequence. Students who do poorly on one sequence might be branched into a remedial sequence, while those who do well are also branched into a more difficult sequence. Materials are always designed to give students the practice they need to meet the objectives of the course.

A UNIVAC 418-111 computer is used in Chicago. It is connected to UNISCOPE display terminals in the schools using telephone lines for linkage to the central system. There is currently no audio component in order to keep the cost at a minimal level. The system now in operation could handle 70,000 pupil sessions weekly and could be available for community use after school hours.

Teachers receive daily class "hard-copy" reports on each student and periodic gain reports from the CAI system. These enable teachers to monitor student progress, provide individual tutoring as needed, and plan more effectively the class activities.

Results for the first year have been published (See Appendix II); those for the second year have not been released as of the writing of this paper.* Educators in the Chicago school system are pleased with student and teacher reaction and with the results as shown on the standardized achievement tests. As a concrete example, absenteeism has been reduced 13%. The Chicago schools plan to extend the CAI service to include tutorial lessons, prepared by teachers and subject matter specialists, which would teach concepts as well as reinforce them.

Amortized over a ten-year period, capital outlay and annual operating costs total $76.25 per student for each curriculur area. If a monetary value were put on the decreased need for remedial teachers and on the fewer teachers required because of reduced student

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*According to a telephone conversation with an individual in the Chicago schools, the standardized test scores are still being processed and will not be available to December, 1973. They expect results to be better than in the first year (as shown in Appendix II) because both students and teachers have become familiar with the procedure and many of the technological problems were solved which in the first year interrupted the computer lessons.

failure resulting in repeating grades, the CAI system could easily be viewed as cost effective.

Multi-Media Usage - Kirkwood Community College, Cedar Rapids, Iowa

This case involves the use of video-tapes, data processing equipment, and concrete objects in the teaching of welding at the post-secondary or trade school level.

Video taped demonstrations were employed so that repeat demonstrations, so common in conventional welding classes, would not consume valuable instructor time. That released time could then be used for attention to individuals as they progressed through the two basic learning units. These units, Basic Arc Welding and Heavy Industrial Welding, were divided into eleven modules. A student was required to complete distinct steps in each of the modules, demonstrating proficiency in the skill contained in that step, and, in addition, passing a written test before being certified to move to the next modular level.

A report of the project describes the unique way of tracking student progress:

> A progress chart was visible in the shop and recorded the level at which each student was working. In addition, the time each student spent in the shop and his attainment level was recorded daily on the individual student's class card. The cooperation of Data Processing then made possible a weekly printout updating the instructors' information about each student's progress and time spent in each step of each module. The instructors used this report as a check to see that any student who spent a longer than average time on any step received additional individualized attention. (4:14-15).

Four variables were examined during the project and the results were compared to control groups using conventional methods. On the first variable, student-time-consumption, those in the project took considerably less time to achieve the objective of learning to weld -- 190 hours compared with 261 in one control group and 233 in another. On a second variable, dropout rate, this was significantly lower (.05 level) for the experimental group than for the two control groups. On an attitude questionnaire, students reported sufficient individual attention was provided; 93% felt the experimental method made such individual attention much more possible than in conventional settings. Per student cost to the institution was $105.97 for the experimental group, $203.74 for one of the control groups operating in a conventional manner, and $183.25 in the second control group. A report of the project provides a typical conclusion about high initial costs on many innovative activities:

> The cost analysis reported here and earlier included the income through tuition, the cost of gas, rods, steel, instructors' salaries, and administration. However, it did not include the cost of putting the demonstrations on videotape or the cost of the receivers necessary to show them. It was assumed that sufficient savings on the variables present in all comparable quarters would allow for recovery over a period of time of the capital outlay required for the experimental presentation method. (4:16).

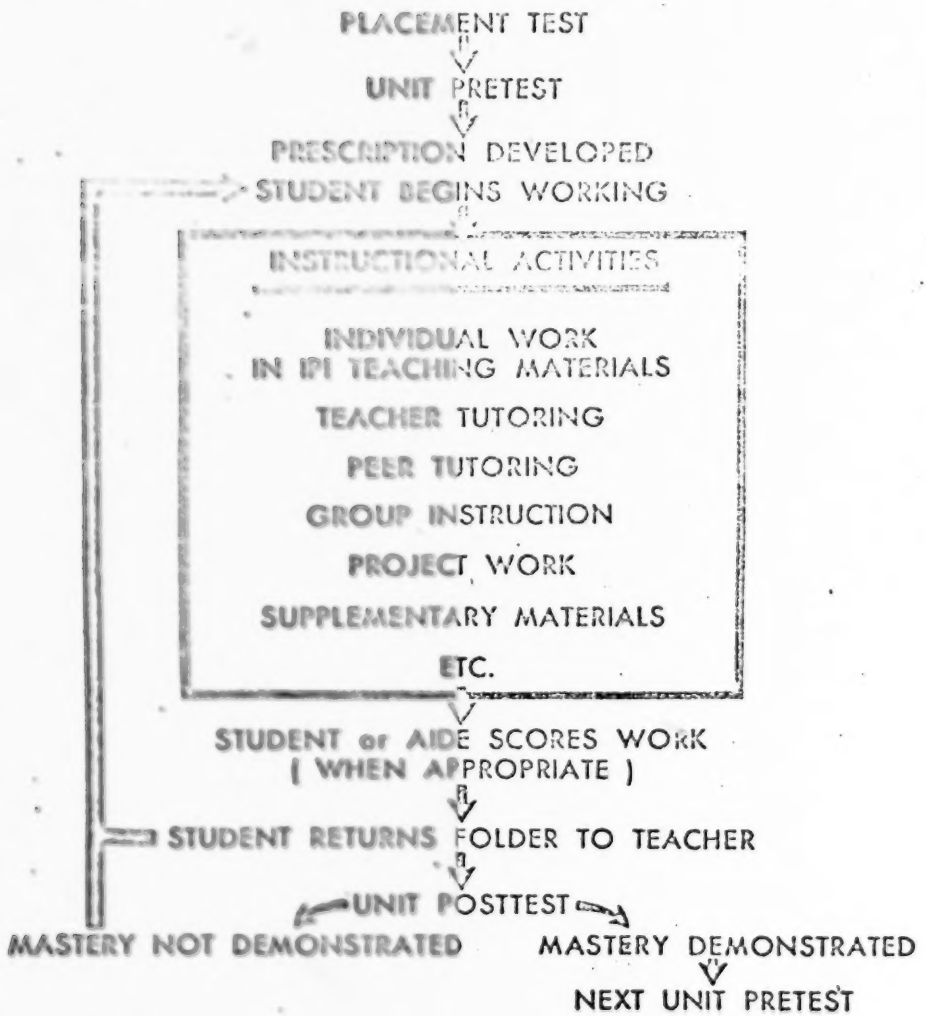
System With Minimal Use of A.V. - Individually Prescribed Instruction (IPI)

IPI is officially defined as "a system of managing instruction so that each child's work can be evaluated daily and so teachers can make assignments for each child which are tailored especially for him. It is a technologically-based system which places heavy emphasis on the process aspect of technology and relatively little use of audio-visual materials themselves." (6:27).

IPD began in 1964 an experimental and developmental project in one school. It has developed and spread until in 1972-73 86,842 students in 40 states were learning with IPI programs in mathematics. (Data on the number of students in the reading and science programs were not available).

IPI is a diagnosis/prescription system which depends upon sequenced instructional objectives, each of which is expressed in behavioral terms. Pupils proceed independently with a minimum of teacher instruction, the teacher using their time for diagnosis of pupil needs and the writing of prescriptions. The chart on the following page illustrates how the system operates. (6:29).

IPI STUDENT ACTIVITIES



The teacher spends his time in evaluating progress of individual students, diagnosing needs, preparing individual learning prescriptions, and in tutoring individuals. The system itself provides many materials for use of teachers in individualizing the prescriptions, but since student needs vary greatly, the teacher plays an important role in making the system operate effectively. Teacher aides are essential to aid in scoring student work, recording results, and in organizing and dispensing the instructional materials.

The prescription sheet is the communication link between the pupil and the teacher since it indicates the resources that can be used in obtaining mastery of the objective. There is a heavy use of worksheets, but in some programs such as reading, there is also use of audio materials, self-instructional readers, story books, and response sheets.

Research data indicates that students achieve as well or better, even ones measured on standard tests, as do students in other classrooms. The IPI system has been tested with effective results on several minority populations. James Becker, who was instrumental in the development of IPI, claims,

> ...IPI technology will be able to reduce what is being currently conducted during the whole school day to much less time. It will be possible to let children learn many of the basic skill subjects anytime during the day. We are hypothesizing that the typical school day can be reduced to one-quarter of the time now spent on these things. This leaves a school day in which we can begin to do many exciting things. (6:36).

Currently, the use of IPI is more expensive than a conventional elementary school program, but the costs are gradually being reduced.

Open Learning Plans

Several attempts to be more flexible and open are now underway in several U.S. schools. These attempts range from opening up the dimension of time, to the creation of freer learning environments, to new places and ways to learn. Four examples are included here which relate to staffing patterns.

Year-Round Schools

There is a growing movement toward schools that are open for longer periods of time than the usual nine months, even though students would not necessarily attend for longer periods than now. The motivation is primarily economic: Why build and maintain an expensive structure and use it only half of the time?* Often, though, another objective is to capitalize on more normal learning patterns by having students away from formal learning tasks for shorter periods of time than the usual two months.

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*Some make a more dramatic argument: There are 8760 hours in a year; school is in session 1080 hours, therefore we use our school buildings only 12% of the time. This is, of course, ridiculous--very few buildings, public or private, are open for more than 1/3 of the time.

There are at least three kinds of plans. In the first are those in which a portion of the student body is always on vacation. These include the "45/15" plan, the "staggered quarter" arrangement, and the non-voluntary "trimester" plan. In plans such as these the students are in some way divided into groups (place of residence, age, type of curriculum desired, family choice, or randomly) and formed into student bodies. In the 45/15 plans groups "A", "B", "C", attend school for 9 weeks while for the first 3 of those weeks "D" group vacations. "D" returns to school with "A" and "B" and it is now "C's" vacation. And so the cycle goes with 25% of the youngsters always out. The primary motivation in such plans is economic--the school building and other capital outlays have to be built for only 75% of those to be served at any given time. In addition, these plans offer many of the same curriculur and instructional advantages as those year-round school arrangements instituted for other than economic purposes described in the next two cases.

A second kind of year-round school plan are those designed to promote individualization of the school program. These include the "Multiple Trails Plan", the Clarion (PA.) College Model developed by John McLain (35) and the "Quinmester" Plan. In these arrangements the variable of time has been manipulated to allow for more attention to such factors as classes with reduced scope of subject matter, bringing about greater intensity and depth, because of fewer classes--opportunity to concentrate on 3 or 4 classes instead of 6 or 7, curriculur sampling, curriculur and instructional experimentation, and reducing the effects of failure by decreasing the investment of time for students, i.e. shorter semesters.

The third category of year-round schools includes those that allow and sometimes promote accelerated school finishing. The "Modified Summer School" Plan, the voluntary "Trimester" Plan, and the "Continuous School Year" Plan are examples. In the latter a 210-day elementary school calendar is proposed which permits completion of seven grades (Kindergarden through Sixth) in six years. Others of this kind allow students to opt for an additional time block either for enrichment or to finish school faster.

Preliminary observations are that most experiments with year-round schools have produced little actual savings and that teaching roles or staffing patterns have not been significantly affected by the innovation. Such generalizations, though, are premature because there are at least three developments that cause optimism. It appears that the 45/15 plan in Valley View School District, Illinois, and in other sites is working to the satisfaction of students, parents, and teachers and is taking place in buildings and with equipment designed for only 75% of the student body.

There is reason to believe that the plan would work well in other communities with similar attributes. Secondly, in the Clarion College demonstration planned for several years and now getting underway there is cause (because of the care that went into the planning and the resources available) to look for curricular experimentation, with an emphasis on matching curriculum to student need. The third development that shows promise is in Dade County, Florida Public Schools and other sites working with the Quinmester Plan--again not for the economic implications but for outcomes in terms of staffing patterns and general instructional and curricular improvement.

Appendix III shows a comparison of the various year-round school plans.

Informal Education

The United States is experiencing a renewal of the progressive education movement of pre-World War II days. "Open schools", "flexible education," "informal education", are words typically used to describe new programs related to that thrust. Its historic roots are from Rousseau, Dewey, Montessori, and Sir Henry Hadow, author of the British report which began the informal movement in that country in 1924. Today's movement has taken the strands begun by those philosophers and practitioners and added to them the work of several learning theorists, most notably Jean Piaget; curriculum innovators such as Jerome Bruner and others; and observers of the larger social scene who could bring public and intellectual support to the movement--Charles Silberman, Joseph Featherstone, Lady Bridgit Plowden, and others.

The most notable experiment in bringing about wide spread use of open education in the United States has been the state-wide program in North Dakota. This program is based on a massive teacher re-education effort designed to change the way in which schooling is conducted, and to upgrade the formal education of teachers. Accomplishments include higher attendance levels, decrease in discipline problems, increased student interest, and gains in reading, math, science. (9:15).

Other approaches at the elementary level include the John Carey School in Richmond, Virginia, where the type of schooling provided is based on age characteristics with the amount of freedom governed by age and readiness levels; those in Dallas, Texas characterized by their open resource center in the middle of the building with books, audiovisual material, and home-like surroundings; and the World of Inquiry School in Rochester, New York where the curriculum is pursued in an informal, culturally balanced setting using a form of the core curriculum approach. There are several high schools in the U.S. maintaining somewhat the same

objectives as other schools but trying to be more effective by providing an informal setting. John Dewey High School in New York City, for example, has most of its Academic program in mini courses in which students can progress as fast as they are able. With the remaining time they are able to pursue their interests in independent study or in other informal ways.

The objectives of informal education discussed here are essentially those of traditional schools--skill development, citizenship education improving abilities to communicate, developing competency in and regard for the arts, and helping students become life-long learners--although in the informal school there is often more attention given to the latter. The chief differences of informal schools is the organization of the classroom, the learning activities provided for students, the sequencing (or non-sequencing) of the curriculum and the role of the teacher. The nature of these differences can be summed up by Silberman's recall of a Chinese proverb: "I hear, I forget; I see, I remember; I do, I learn."

There is a marked difference in the appearance of an informal classroom from that of the formal one. Pupil desks are replaced by tables large enough for the group work of several students or for the large project activity of an individual; children work independently or in small groups, many of them exploring various learning centers around the room; the teacher's desk is unobtrusively placed in one corner; there are materials--books, different sizes of paper, science equipment, art supplies--everywhere; and the children are freely talking to others as they engage in their work. The activities of the students range from independent work on various sill development exercises to large group work designed by the teacher to develop a concept in social studies or to promote a kind of artistic expression.

Less attention is given in the informal classroom to curriculur sequencing; more to developmental growth patterns of individuals with special attention to the various stages of readiness each has for a given curriculur objective. Teacher's role, then, becomes one of diagnoser of individual learning needs; selector and arranger (often with the student) of ways to acquire the new learning; and record keeper, evaluator of each student's progress. The teacher seldom lectures or plans learning opportunities for whole groups. He would never establish groups of youngsters on a long term basis. Instead, small groups of students would be brought together and taught a commonly needed skill such as a kind of punctuation. At other times, children would meet together who had a common interest such as doing a mural painting or writing an original play.

Informal education of this kind discussed here costs no more or less than more traditional forms of school. There are no special considerations that cause it to be more expensive. Also, there is no evidence that buildings built specially for informal education costs more than traditional "egg crate" ones. (As a matter of fact, in Dallas, Texas schools built for open education have cost $20 per square foot, while traditional ones have cost $25.)

Most informal classrooms use more expendable instructional materials than the typical classroom. There can be balancing savings, though, since materials such as workbooks or class-size collections of textbooks would not be appropriate purchases for an informal classroom. Many informal classrooms have aides but their costs, too, are often balanced out by larger class size.

Schools Without Walls

Growing from the same traditions as informal education is a relatively new phenomenon on the American educational scene, schooling without a building. The intent of this movement is to bring about significant and basic changes in the way in which school is conducted.

A significant change proposed by the proponents of this form of schooling is the source of educational objectives--the student himself. In many of these schools, students are trusted to make their own decisions about the kind of education they wish to receive and the way in which they will acquire it.

In Philadelphia's now famous Parkway Program, students made the first and most basic decision, whether or not to attend this school. After that, the student must choose everything he does within the program. If he does not make a choice or cannot make a choice, then nothing happens until he does. Through a system such as this students learn, with the help of advisors, to make decisions--hopefully with increasing skill--and to understand the process through which one goes to make such decisions. In the case of Parkway, there is a rich variety of choices available to the students, for he has the whole city from which to choose his teachers and his curriculum. If he wants to study journalism he does so at the metropolitan newspaper; if he wants to be an artist he works in an art museum; if he wants to learn a business the staff of the school will help him to find an appropriate resource. In short, Parkway created a learning community with its structure being provided by student choice and tutorial groups. These tutorial groups, consisting of approximately sixteen students who met for a few hours a week with a faculty member, provided personal encouragement, support and counseling, and a place where special attention could be paid to the basic skills of language and mathematics.

Parkway had over a hundred cooperating agencies. Some of them were the Academy of Natural Sciences, the Atlantic Richfield Company, the Convention and Tourist Bureau, The Film Media Center, the Hahnemann Medical College and Hospital, the Insurance Company of North America, Perfect Copy Service, Inc., Philadelphia Museum of Art, Philadelphia Music Academy, Philadelphia Zoo, Wanamaker Department Store, and the Weinstein Geriatrics Center.

In fiscal year 1970-71 the Parkway School ran on an annual per student cost of $720--about the average cost per student in Philadelphia for that year. Other schools, however, have costs not reflected in that average--primarily the school building itself. That cost, according to estimates in 1971, for a two-thousand-student building in Philadelphia would have been twenty million dollars; but since the amount would have to be borrowed, it would have actually cost the taxpayers forty million dollars. Also, these figures do not include heating and maintenance, which in Philadelphia cost about $100 per student per year. Parkway used virtually none of this money since it had little space to maintain and operate. Attendance during 1971 was at 89 percent, somewhat higher than the usual rate of attendance in Philadelphia high schools. (Although, this figure may not be very reliable because of the nature of attendance keeping procedures at Parkway.)*

Obviously, there is a tremendous difference in the tasks of the teacher in a setting such as this. He must, as required, help students articulate their needs. On other occasions, the teacher acts as a guide to those resources which help students meet their needs--sometimes filling that need himself but often finding other sources of help. And the teacher must also be an independent observer of the student, acting as a friendly critic and counselor for the future.

In at least two experiments conducted in the United States, the Parkway Program in Philadelphia and the Home Base School in Watertown, Massachusetts, there is firm evidence that pupil achievement as measured by the usual methodology either remains constant in these freer schools or is improved. This is particularly true when one looks at the success that Parkway has had with former dropout students.

On other measures, such as student interest in school, feelings of satisfaction, and desire to pursue more advanced education, there is very strong evidence that the efforts of those who would open up the school environment are being successful.

An Open Learning System on Television

In the Fall of 1969 a television show designed to systematically develop young (3-5 years old) children's readiness for reading appeared in the United States. "Sesame Street", in 1972, was being viewed by nine million children. A total of 130 hours of

*These data taken from The School Without Walls, bibliographic entry 28.

instruction was prepared at a rate of less than 1/2 cent per student hour. Longitudinal research has shown that television can be an effective medium for teaching important simple facts and skills, such as recognizing and labeling letters and numerals, and more complex higher cognitive skills, such as classifying and sorting by a variety of criteria. An important finding of the preliminary research was that the program did not require formal adult supervision in order for children to achieve the program's objectives. Since most of the youngsters who viewed the program were pre-school age, this finding has led many to seek greater use of the television medium for direct instructional experiences outside the school building.

Children's Television Workshop, producers of "Sesame Street", in 1971 put "Electric Company" on the air for young school age children--especially those with reading problems. In its first year four million youngsters viewed the show (2 million in school, 2 million after school) and in its second year six million students participated. Again, per pupil expenditures per hour of instruction are very low because of the tremendously large viewing group. (13)

Extensive research indicates that in the 19 curricular areas in which the show worked viewers scored significantly higher on standardized achievement tests (appropriately called 'the Electric Battery') than did non-viewers. These gains were not restricted to the target population in the lower grades (higher grade youngsters insisted on seeing the show, too). Fourth graders, for example, gained significantly in their ability to punctuate.

The teacher's role in the classroom in which Electric Company is used is one of preparing youngsters in advance for the exercise they will have with the show and doing follow-up with new learnings after it is over. Materials are available to help the teacher.

Appendix IV provides additional research information about Electric Company.

Part III: Conclusions and Implications

The principal method used to try to improve school quality in the quarter century following World War II has been to reduce the number of students which teachers meet each day. For example, the student/teacher ratio in elementary school in 1955 was 30.2 as compared with 24.4 in 1972; for secondary schools, the student/teacher ratio in 1955 was 20.9 as compared with 18.9 in 1972. Since teacher salaries constitute the largest single budget item (approximately 75%), it is increasingly difficult to bring about school improvement in this manner. In a medium size school district of 50,000 students it would cost 1/2 million dollars in salaries per year to reduce <u>each class</u> by one pupil; in a large

district it would, obviously, cost millions. In the United States, where school costs have risen much faster than the Gross National Product, it is almost impossible to get approval for such an investment even if all data supported the addition.

There is an interest in higher productivity in education, but the search for ways of achieving this has altered in the past decade. As the selected innovations reviewed in Part II make apparent, the focus now is not on increasing student/teacher ratios or on cost-effectiveness per se but rather on improving the quality and effectiveness of education at the same or at moderately increased costs. This is caused by a number of societal factors. The USA has moved from a time when there was a shortage of teachers to an oversupply (given our present staffing and use patterns); from weak teachers' organizations to very powerful ones interested in protecting members from a labor point of view; from relatively hig federal support of innovative practices to very little federal support; from experiences with innovations that were expected to become widespread if they proved desirable to the concept of alternative schools or a variety of offerings to the public; from the goal of raising the general quality of education, particularly as it pertained to factual information, to a concern with more humanistic values such as cultural identity, equalization of opportunity for minorities, individualization of instruction, and socialization techniques.

In order to help clarify the distinctions and features of the innovations described in this paper, the authors have developed a table which, in a generalized way, compares several innovations on four variables. (See Table 5). A study of the chart reveals that the first decision needed when considering installing an innovation is one of purpose: are the present goals and objectives acceptable? Are new ones to be substitute? Are new ones to be added on? Is the total school population to be affected or only a particular segment? Must the innovation be achieved without increasing costs or can the "value added" be financed through increased costs? An innovation may fit some conditions but not others.

Conceptualizing school problems and building solutions that match need is the important first step in improving educational quality. The table of comparisons is a rough first attempt to demonstrate that the "innovation pharmacy" is not empty, that we can begin to correct school problems more rationally by selecting appropriately from the growing number of tested options --particularly when we are better able to match problem and solution.

TABLE 5

Comparison of Fourteen Innovations on Four Variables

Innovation Described	Differences in Educational Objectives	Differences in Instructional Strategies, Teacher Tasks & Staffing Patterns	Resource -- Differences in Use of Technology	Costs	
				Capital	Operating
3 on 2 in Hawaii.	Much the same as in a traditional school and added to it a greater opportunity to strengthen the language program.	Team planning. More individual teacher contact with students, large group instruction.	Some use of overhead projector and other devices for large group instruction -- other than that no significant differences.	Higher initial cost--normal after	Higher
Individually Guided Education (IGE).	Expanded to include work in pre-reading, environment, other objectives remain as is.	"Diagnosing" and "prescribing" functions more necessary to the program; planning for instruction legitimized; senior people have school-wide curriculum development responsibilities; differentiation in staffing.	Mini-courses in some curriculum areas are a part of the system.	Not necessarily higher	Slightly higher
Team Teaching; NASSP Model Schools Project.	On-going curriculum revision necessary to model; fewer required studies; more opportunity for student selection.	Individualization; more independent study; opportunity to vary instruction by manipulating class size; task differentiation in staff; lighter student contact load; more planning time; use of non-professionals.	Increased use -- especially by students.	Same after initial remodeling	Same
Differentiated staffing: Temple City, California.	Same as traditional schools.	Teacher tasks based on analysis; pay related to responsibilities; vertical differentiation; use of non-certified staff.	Same as traditional schools.	No change after initial remodeling	Higher

TABLE 5 (Continued)

Comparison of Fourteen Innovations on Four Variables

Innovation Described	Differences in Educational Objectives	Differences in Instructional Strategies, Teacher Tasks & Staffing Patterns	Resource -- Differences in Use of Technology	Costs	
				Capital	Operating
Vertical Differentiated Staffing: Mesa (Arizona) Model.	Much the same as in the traditional school.	System problem-solving model: needs identification, strategy development and implementation, evaluation; teachers become managers of instruction; internal performance contracts (bidding); vertical hierarchy but not a permanent one (fluid)	Teacher control of resources acquired	Not available at this time	Not available at this time
Closed Circuit Television - Washington County, Md.	None except some subject areas covered which were not previously available to students.	Some large group TV viewing; less "presentation" of classroom teacher; the TV system and the classroom become a team and the studio teacher and the classroom teacher also become a team.	Closed circuit television and a media resource center required to install this innovation.	High initial cost.	Same -- lower if additional subject areas considered.
Computer-Assisted Instruction - Montgomery County, Md. Public Schools	Same as traditional schools.	Reliance on computer for diagnosis, drills, some tutorial work, and monitoring of student progress; programmers added to staff.	Modular segments of computer-assisted instruction.	Increased 10%	Higher
Computer-Assisted Instruction - Chicago, Ill. Public Schools	Same, except greater emphasis on helping culturally-different non-achieving pupils	Use of computer for diagnosis, drill, and practice in three elementary subject areas; use of daily student progress reports from computer to develop student classroom programs; paraprofessional runs computer room.	Computer-assisted instruction 10 to 20 minutes per student in three curricular areas	$30 per student year per curricular area higher	$70 per student year per curriculum

TABLE 5 (Continued)

Comparison of Fourteen Innovations on Four Variables

Innovation Described	Differences in Educational Objectives	Differences in Instructional Strategies, Teacher Tasks & Staffing Patterns	Resource -- Differences in Use of Technology	Costs	
				Capital	Operating
Computer-Assisted Instruction - Kirkwood Community College.	Same - competency in welding.	Learner-centered modular learning units; interaction with students on individual basis as required; fewer teachers required.	Video-taped demonstrations, data processing	Higher during initial period of time	Lower
Individualized Prescribed Instruction (IPI).	Purpose is to individualize instruction - curriculum content little changed.	Implementation of an instructional system. Teacher tasks include an emphasis on diagnosis and prescription, selecting and preparing learning materials, and managing instruction; aides are added to the typical staffing pattern.	Programmed materials used; some AV materials and equipment in some subject areas but otherwise minimal.	Not applicable	Higher because of cost of materials
Year-Round Schools.	Usually the same as traditional schools.	Strategies and tasks remain essentially the same as regularly-scheduled schools, often staffing pattern is affected because of different lengths of teacher contracts - some can work the usual 180-day school year while others can work a full twelve months.	Not necessarily different than traditional schools.	Usually lower	Usually lower
Informal Education.	Generally the same as in other schools, but in some greater emphasis on affective education.	Greater amount of individualization and pupil determination of tasks, more flexibility, often aides - particularly volunteers.	Not necessarily different than another kind of school.	Sometimes higher initially	Not necessarily higher

TABLE 5 (Continued)

Comparison of Fourteen Innovations on Four Variables

Innovation Described	Differences in Educational Objectives	Differences in Instructional Strategies, Teacher Tasks & Staffing Patterns	Resource -- Differences in Use of Technology	Costs	
				Capital	Operating
Schools Without Walls.	Greater attention to helping student determine own ends, attention given to such processes as decision-making, values, clarification, and learning how to learn.	Program is almost totally individualized, although in some places small groups are formed for single-need purposes; teacher is a counselor, guide, seldom a giver of information; many more kinds of teachers including people in the community who other have other employment and who help youngsters on an "apprenctice" basis.	Much greater use of technology since, depending on what is available in the local community and in the places with which the school has access.	Lower	Not necessarily higher
An Open Learning System Using Television (Sesame Street and The Electric Company.)	Greater attention to getting students to care about learning and to help them catch up if they are behind in fundamental skills.	Most known instructional strategies employed; teacher is purveyor of information or the causer of inquiry; professional actors become teachers.	Television in the home and in the school and also some use of material to accompany the television programs widely distributed.	High for regular broadcasting. Program preparation high initially, decreasing as the supply of programs is built.	Very low per pupil expenditure

Conclusions

The authors believe that the innovations reported and others studied in the preparation of this paper would support the following conclusions:

1. Reducing class size does not necessarily improve learning results; some goals can be achieved as well as in large group situations as in smaller ones -- although not all goals.

2. There are often less expensive ways of increasing educational effectiveness than by reducing teacher/student ratios, especially when class sizes reach a mean size of 26 to 30 students.

Educational Turnkey (14) has made an interesting study concerning how much of 25 types of resources would have to be changed in order to affect a 1% change in the school district budget (See Appendix V). The most expensive change is to reduce the pupil/teacher ratio, with changing teacher salary being almost as expensive. On the other hand, increasing expenditures for such items as instructional materials and equipment has little relative effect on the budget.

3. When innovations are installed, they tend to change goals and the basis for determining quality rather than to bring about improved ways of achieving current goals and objectives. For example, an effort to reduce the failure rate might instead, or in addition to, bring about individualized instruction or a more humanized curriculum. Innovators should anticipate that the schools have a way of taking innovations in and changing them in unanticipated ways.

4. The initial cost of an innovation tends to be higher than what can be expected once the innovation has been established. Studies of the introduction of computer-assisted instruction, individually-prescribed instruction, informal education, differentiated staffing all show that there are costs connected with minor remodeling; the purchase, lease, or preparation of materials; in-service education costs; consultant services; and the like. One surprising factor, at least to the authors, was the comparatively small amount spend upon upgrading teacher competencies when innovations are introduced. One study made by the U.S. Office of Education relative to a differentiated staffing innovation showed that about the same amount is spent on in-service training as on teacher substitute pay and much less than on paraprofessional fees.

5. There is a tendency, when innovations are introduced to hire additional personnel already possessing new skills rather than to retrain the current staff and reassign them to new functions.

6. In the United States, there is more interest in and acceptance of the concept of increased teacher productivity and improved working conditions for teachers than in reducing the student/teacher ratio.

7. Inherent in many of the innovations are the beginning steps toward more effective staff utilization although this has usually not been stated as a primary goal of the innovation. For example, the IGE program, with its curriculum development and instructional delivery system, is causing greater attention to be paid to discrete teaching tasks and that attention to basic considerations about teaching and learning will bring about more efficient staff utilization.

8. Innovations may benefit the schools in important but indirect ways such as raising the level of student motivation, reducing the failure rate of students, thereby decreasing the need for reteaching, remedial teachers, saving student time, improving student attendance in school.

9. Innovations such as those described here have increased the number and complexity of instructional decisions. Time and training need to be provided for teachers as they make more of the basic instructional decisions. Fortunately, this new decision-making responsibility is coupled with the recognized need for learners to have an increasing independence and to not be so closely supervised, at least by certified teachers.

Implications For Policy

The authors of the paper believe that there is inherent in the U.S. experience with innovations, particularly those affecting staff utilization, some valid implications for policy.

1. Use of Teacher Aides to Perform Non-Instructional Tasks

By non-instructional tasks is usually meant such assignments as playground supervision, monitoring study halls, athletic events, and social events; filling out forms and reports, typing tests, and reproducing these, inventorying supplies and the like. Studies vary in the amount of non-instructional time which teachers put in, but in all of them it is a sizeable amount. For example, in a recent study done by Gerald Krunbein (30:305-329) of high school teachers in California, it was shown that approximately one-fourth of the teacher's total time was spent executing non-instructional tasks. On an average yearly salary of $11,318, this meant that the per-teacher cost of non-instructional tasks per year was $2,877.99. It is obvious that even if para-professionals were paid as much as five dollars per hour, some savings could be made in salaries and it is reasonable to assume that some of the non-instructional tasks could be performed by people paid as well as two dollars per hour.

Many of the non-instructional duties, when performed by teachers, require the payment of extra compensation about the contracted salary. Over one-third of the teacher collective bargaining agreements on file with the NEA Research Division contain provisions granting extra compensation for a variety of extra duty assignments. This tends to push the cost even higher for handling non-instructional tasks with certified teachers.

2. Criteria for Selecting Appropriate Innovations

After the goals for an innovative practice have been established, it will be found that some kinds of innovations will accomplish the goals much less expensively than others in a given situation. (See Appendix V and 24 in bibliography). Factors that must be considered include: (a) the cost of initiating the innovation; (b) the availability of the materials to support the innovation, and the cost of these; (c) the size of the student population to be served; and (d) the degree of diversity and decentralization within the school system.

In a highly decentralized educational system, it is difficult to implement a large-scale change even though it would prove effective. This is a major reason why such innovations are more difficult to implement in the United States than say in Samoa, El Salvador, or Niger.

Capital intensive innovations are efficient only in large-scale operations where large audiences can be reached, or at least the software has been developed outside the school system so that it is not necessary to add its development to the school operating budget. Examples such as the following will illustrate this point. The cost of radio ranges from one-third cents to four cents per student per hour. The low end of the scale would require several hundred thousand students whereas the cost for a few thousand would easily reach the higher end of the cost scale. In a comparable way, the cost of instructional television is said to range from 1.5 cents to fifteen cents per student per hour. The low end of the range would require an audience of close to one million students. A rule of thumb for computer-assisted instruction is eighty-five cents per student hour if the terminal is used 2,000 hours per year.

3. Application of the Middle Management Concept

As has been pointed out, the greatest opportunity for reducing the cost of education would arise from increasing the student to certified teacher ratio. Also as has been pointed out, interpersonal relations tend to suffer as the student/teacher ratio increases. There is a difference of opinion concerning the effect on cognitive learning. Innovations have been undertaken which would tend to decrease the number of certified teachers per student population while increasing the number of non-certified adults

in contact with the students. In the NASSP or Trump Plan, the role of the school principal was changed so that a greater percentage of time could be spent in middle management functions of instruction. This, coupled with horizontal differentiation in the role of certified teachers and the addition of teacher aides resulted in a new staffing pattern. In the Temple City and Mesa differentiated staffing experiments, certified teachers are arranged in a hierarchial pattern so that a middle management function emerges. This pattern can also be seen in the IGE multiunit school where senior teachers take on middle management program functions. Kiesling (18) also supports the notion that the "middle level management" concept holds considerable promise if applied to education.

4. Better Use of Capital Investments

Improved use of capital investments such as buildings, materials, and equipment could not only effect teacher roles but result in greater productivity in and of themselves.

We have already seen that the concept of the year-round school has implications for more cost effective use of buildings, equipment, and materials. There is also a possibility for teachers that so desire to increase their annual earnings as well as to provide opportunities for teachers that wish shorter teaching terms than a full year.

We need more practical experiences with the schools without walls concept, particularly as it can be adapted and also combined with other ideas such as year-round schools.

Another example of the way in which capital investments can change teacher tasks is through the use of the computer to reduce the teacher time required for grading, diagnosis, record-keeping, and the like.

Incentives to Schools to Experiment With New Teacher Roles and Staffing Patterns

There are some types of activities which hold promise for encouraging educational institutions and teachers' associations to view experimentation with teacher roles and staffing patterns in a more favorable light. Among the many that could be mentioned are the following:

1. Involve teachers and teachers' associations in the planning for innovations. Become more definitive about teacher role in decision-making -- insuring its place at the instructional level and at planning stages.

2. Provide adequate in-service education and professional development both before the innovation is introduced and during

the implementation stage. Emphasize an individualized approach to this kind of teacher career development.

3. If adjustments are to be made in the number and/or type of staff employed, make the adjustment by attrition rather than by replacement of those already on the staff.

4. Provide funds from outside sources to cover the added cost of initiating innovations. We have found that in the United States very few major innovations are introduced without this stimulation of outside funds. In past years, this has frequently come from the U.S. Office of Education or the private philantropic foundations. Matching grants are often a good plan, particularly if these are extended a three-to-five year period and diminish so that the total cost of the innovation is covered by the school district by the end of the initial phase.

5. The development of expensive software with federal funds provides an incentive to schools; television programs, CAI programs, and the like are exceedingly expensive and none but the largest communities or the wealthiest schools can cover the cost of developing such software in their annual operating budgets.

6. Some favorable experience has accrued in the use of performance contracts for teachers within a school system as opposed to the bringing in of an outside industrial firm (sometimes called bidding); also the use of voucher systems within the public school system has, in the one situation where this has been tried in the United States, provided an incentive for the provision of alternatives within the school system.

7. Innovations which cause teachers to feel more productive and professional have a better chance of success than those which tend to not affect that variable. Examples of favorable innovations might be those that tend to "turn students on", reduce discipline problems, produce the necessity for re-teaching, relieve teachers of non-instructional tasks, and the like. Also, innovations which reduce teacher/student encounter time have a greater chance of success.

In Conclusion

Much has been written about the recent criticisms of the schools in the United States and it is true that both the public and the education professionals are desirous of an improved educational program. The criticisms should not be taken, however, as a loss of faith in the schools *per se* or in teachers. A recent Gallup Poll overwhelmingly reports a belief by citizens in the United States that schools are better now than when they attended. Also, respondents listed teachers as one of their "favorite things" about schools. Lack of proper financial support is seen to be a

pressing problem, so that one can predict that in the future in the United States, there will be increased interest in productivity in education. In fact, this productivity will be reached not through the hiring of fewer teachers but through efforts to make teachers more productive through the use of non-certified staff, improved middle management concepts, and the use of technology.

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A P P E N D I C E S

APPENDIX I

Copy of One of the Completed Questionnaires Sent
to Directors of Fifty Innovated Programs

August 15, 1973

Dear Dr. Jennings:

We are helping the Organization for Economic Cooperation and Development (OECD) look at the effect of innovations on teacher roles and staffing patterns. We understand that you have an innovation in your school(s) that would be useful to be included in this study. The innovation has been described to us (either through individual contacts or from the literature) as [illegible]

Would you help us by completing this informal survey on innovations and effect on teaching roles -- it should not take too much of your time -- and return it to us in the enclosed envelope as soon as possible. We would like to begin to pull the material together very early in September; your prompt response would be appreciated.

In Part IV of this form, we ask if you can send us material in addition to that which will be contained in this survey. It would be helpful if that material could accompany your reply.

Thank you very much for your assistance.

Anna L. Hyer
Robert M. McClure

I. Status Information

Person Reporting: Wayne Jennings

Name of School District: Ashland Approximate Number of Students 5600

Approximate Number of Students Affected by the Innovation: 500

Is the Innovation in One School, if so, Name of the Building: Ashland Senior High

Intent of the innovation you are reporting on this survey (you may check more than one of the following):

[✓] To affect content: math, social studies, language, and the like.

[✓] To affect the process of teaching: inquiry, programmed instruction, problem-solving, and the like.

[✓] To affect particular factors in student/instructor contact: team teaching, tutoring, off-campus programs, content specialists, differentiated staffing, and the like.

[✓] To affect the vertical organization of the school: multi-grading, non-grading, individualization which allow time variations for the learner, year-round schools, and the like.

[✓] One that focuses on development and/or use of new materials: creating a media development center, new instructional materials in a curricular area, and the like.

[✓] To affect interpersonal relationships: counseling, developing helping skills, participatory goal setting, and the like.

[✓] Other generic descriptions of intent not covered by above: See attached pp 2-4

Other comments that would help us to better understand the nature of the innovation you are reporting:

1. Age level(s) for which the innovation is intended: 5-18

2. Is it designed for a particular group within the student body? all

   [✓] Children of the economically deprived

   [✓] "Gifted" children

   [✓] "Slow" learners

   [✓] Physically handicapped

   [✓] All students of a given age range

   [ ] Other: _____

3. What motivated your school(s) to initiate this innovation: _____

   Parents

4. Was the staffing pattern affected by the innovation? _____
   If so, please describe _____

   Selected for program

5. Comments other than those above that describe your innovative practice:

   See attached

II. Teaching Roles

Following are a number of items related to teaching that might be affected by an innovation. If the particular innovative activity in which you are engaged has had an affect on teacher roles in the way described in the item, please complete the three columns to the right of the item. If your innovative activity does not affect teacher roles as described by the item, do not complete the columns to the right.

Item	Observers would probably say that teaching behaviors had changed in these ways	The school did these things to help teachers change their teaching behavior	Observers would probably say that students have, as a result of this innovation, changed in these ways
(a) Presenting Information	- from information giver to guide and facilitator primarily	- training - films - articles	- increased as - self-initiating learners
(b) Questions and answers - recitation			
(c) Student testing & evaluation	- work with students as advisors - few tests	- abandoned grades - wrote forms - training sessions - committee	- self-evaluation - students write goals

APPENDIX I (continued)

Item	Observers would probably say that teaching behaviors had changed in these ways	The school did these things to help teachers change their teaching behavior	Observers would probably say that students have, as a result of this innovation, changed in these ways
(d) Selecting and preparing materials of instruction & arranging the learning environment	- always on lookout - - great variety	- provide catalogs & resource compendiums	- utilize many sources, mobile, events in & out of school and beyond usual time sloth [illegible]
(e) Interpersonal relations	- Warm - understanding - sensitive - informal	- Courses - workshops - reading - confrontation	- higher self-regard w understanding of others
(f) Record-keeping	- non-grading - see growth along many dimensions	- abandoned reports - initial conferences	- student set goals - appraise self

Item	Observers would probably say that teaching behaviors had changed in these ways	The school did these things to help teachers change their teaching behavior	Observers would probably say that students have, as a result of this innovation, changed in these ways
(g) Classroom management	- student-group training - first name basis - greater variety of courses, material, & experiences for youth	- training - visitation - students choose own courses	- greater initiative - explosion in learning
(h) Lesson planning by teachers	- establish own schedule of classes - utilize community / resource people, students as teachers	- workshops - abandoned required courses	- excitement about school - explosion in learning
(i) Other			

III. Allocating Resources

Using only the criterion, "wisest use of available resources," please comment on the innovation:

A. Would the innovation, if widespread through your school(s), affect per pupil expenditures? no

B. If yes, could you estimate, rather precisely, how significant that effect would be?

C. Have ways been devised to assess the "cost effectiveness" of the innovation? If so, could you describe them?

Same per pupil expenditure, on better test scores & learning. Positive experience may indicate annual achievement in gr. K-12 will be reached by grade 12 or less.

IV. Acquiring Further Information

A. If we need further information, may we be in touch with you? yes

Address: 1885 University
St Paul Minn 55104

Telephone: 612 (Area Code) 642-0156

B. If we need further information which teachers in the program can best supply, may be contact them? yes

Name: Joe Nathan
Address: same

Telephone:

Name: Beth Zimmerland
Address: same

Telephone:

C. If there are printed materials about your innovative activity available and they can be easily included in the return envelope provided for this survey, we would appreciate your sending them along. If not, please list the titles, address for requesting them, and price below:

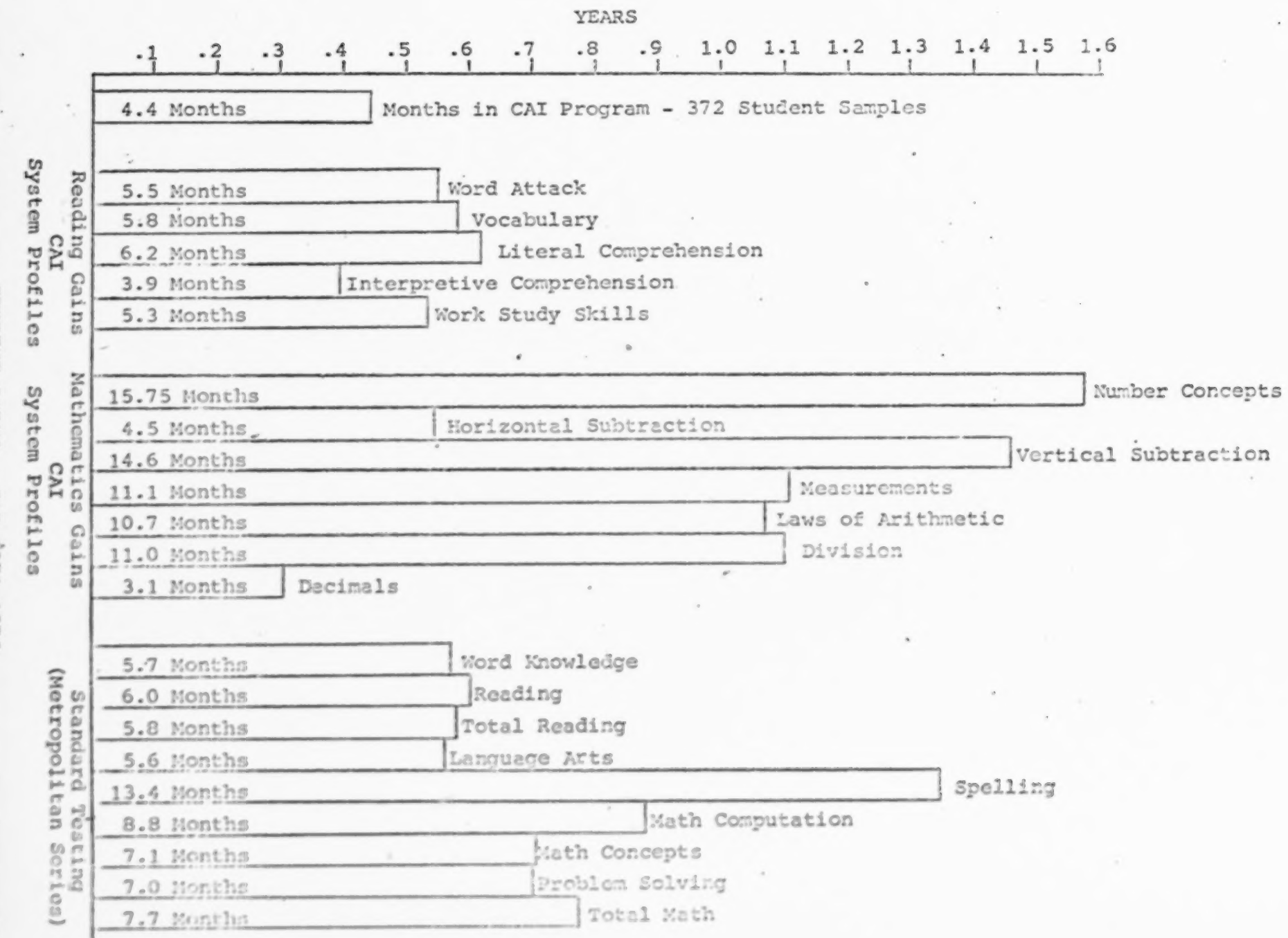
Again, many thanks for your help.

Anna L. Hyer
Development Coordinator

Robert M. McClure
Field Coordinator

Instruction and Professional Development, National Education Association, 1201 - Sixteenth Street, N. W., Washington, D. C. 20036

APPENDIX II



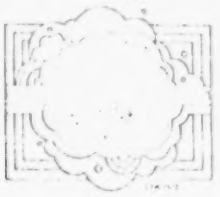
STUDENT GAINS - CAI 1971-1972

APPENDIX III

VARIOUS FORMS OF YEAR-ROUND SCHOOLS

Commonly used names of various plans	Treatment of Three Typical Objectives		
	Individualization or other attempts to change instruction or curriculums	Acceleration of student completion of school	Conservation of economic or other resources
45/15	Could lead to improvements because of change of pace, reduction of learning loss over summer, or other factors related to scheduling but this is not primary motivation & there is little hard evidence.	No	Primary motive--to construct plant & other capital outlay expenditures at 75% level
Staggered 1/4		No	Teachers, too, can choose length of time to be employed.
Trimester (nonvoluntary)	Calendar is not significantly different from that used now so instr improvement is not a direct outcome of the plan	No	See above--generally 1/3 of student body out at all times
Trimester (voluntary)	See above but with added complication that some students will be present during the third time block & others will not	Possible	Some savings, depending on the number of students who choose to go to school during third time block
Multiple Trails	School day is divided into time modules of different lengths to accumulate different courses. Aim is a continuous progress school	Yes, although a similar number of students could also take longer than usual.	Not a primary consideration although there is no evidence of increased costs
Clarion College	Primary purpose is to improve program through individualization, cross-age groupings, experimentation, and teacher education incl. in-service		Not primary consideration
Quinmester	Three purposes shape the plan: expanded curriculum because of mini courses, greater opportunity for experimentation, and reducing effects of student failure.	Possible	Not primary consideration
Modified Summer School	Summer program for enrichment or remediation is dropped; now one offers semester's work as in regular school setting	Yes	Costs can be higher especially if summer enrollment is low
Continuous School Year	Has as an aim to do away with graded structure & replacing with learning levels.	Primary purpose	Can save money by educating more students in the same facility

Who's Listening from



23 Frequently Asked Questions About The Electric Company Answered by Its Teachers

Dr. Vivian Horner, director of research for "The Electric Company," answers the queries most often put to her and the staff of the Children's Television Workshop by classroom teachers. Her answers are based on several nationwide studies undertaken for CTW by independent testing and survey organizations and CTW's own research in classroom utilization of the reading series.

1. Is The Electric Company widely used in classrooms?
A. Yes. A nationwide survey of the program's utilization in schools indicated The Electric Company was watched in nearly 23 percent of all elementary schools in its first year. During the second season a followup survey indicated that 34 percent of all elementary schools are using the show.(It is significant that only 51 percent of all schools have TV sets.)Total audience for the program jumped by 50 percent between the first and second years. The Children's Television Workshop estimates that six million children, including preschoolers, watch the show regularly.

2. What has been the response of teachers using The Electric Company?
A. According to the Herriott-Liebert survey,* some 85 percent of teachers using the show in the first season reported a "very favorable" overall opinion of the series; 43 percent of this group, said that their opinion was even more favorable at the end of the year than when they first saw the program.

3. Are children enthusiastic about The Electric Company?
A. 80 percent of the teachers surveyed reported that their pupils were "very interested" in the series. An additional 17 percent noted "slight interest." 43 percent of all teachers said that student interest had increased over the season.

4. Is the program educationally effective with first, second, third and fourth grade children?
A. Yes. According to the Educational Testing Service** evaluation, children who watched the show regularly in school scored significantly higher than their non-viewing counterparts on the reading achievement battery administered to evaluate the impact of The Electric Company's first season.

5. Can the program be used with children at various reading achievement levels or must it be used selectively?
A. Poor readers, average readers, and good readers in grades 1-4 have all demonstrated some gains on the reading achievement tests. Of course, the largest gains tend to be among those children who have the most to gain from the show's curriculum; that is, among new readers and young children making slower reading progress.

6. Is the program effective with black children, white children, children from Spanish backgrounds, urban and rural children, boys and girls?
A. Yes, it is effective with all these groups. Children from all sub-groups tested by the Educational Testing Service showed similar benefits from watching The Electric Company.

7. In which specific curriculum areas has the program demonstrated measurable effects?
A. Gains were demonstrated in all 19 curriculum areas covered by the ETS tests, although the particular areas of gain were different for children at different grade levels. For example, *punctuation* was an area of significant gain for fourth graders, whereas second graders gained significantly in virtually all curriculum areas. The most dramatic gains tended to occur in the curriculum areas on which the show spent the most time, such as *morphemes, consonant digraphs* and *silent-e*. (For more detail on the gains registered, see the summary report of the ETS survey.)

8. Are any materials available to teachers to help them make the best use of the program?
A. Yes. A bi-weekly teacher guide delineates the curriculum to be covered by each show and suggests activities and games which the teacher may want to use. The Guide is available from Subscription Office: Xerox Education; Columbus, Ohio 43216.

9. What have been the criticisms of the show? What changes have been made in response to them?
A. The Electric Company continues to be an experimental show—just as it has been from the beginning. An extensive program of summative and formative research is carried out concurrently with programming. This allows changes to be incorporated as production goes along. For example, a major criticism by our Board of Advisors during the first season was that The Electric Company tried to teach too much in each program. During the second season the number of curriculum goals in any one show was cut down, while research continues to determine what the best combination is.

Another criticism of first season programming was the pace of the show. Many advisors felt that the program was too frenetic, bombarding the child with too much too fast. They suggested programming ideas which

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*"Who Watched The Electric Company," a summary of the major findings of 1971-72 school and teacher utilization studies, prepared by Drs. Robert E. Herriott and Roland J. Liebert.

**"Reading with Television: An Evaluation of The Electric Company," by Samuel Ball and Gerry Ann Bogatz, Educational Testing Service, 1973.

would provide "breathing space" for the child. These have been incorporated in the second season's programs.

Ongoing research has suggested that along with putting limits on the number of curriculum items in the show, it was necessary to make print more obvious and leave it on the screen longer, so that slower readers would have time to scan it. Second season programming has included larger print, more advantageously placed, and of longer exposure.

10. Is the level of humor too sophisticated for school children?

A. In some cases the answer may be yes, particularly with verbal humor. But in order to capture and hold the attention of a diverse audience the program must operate on several levels at once. If the humor sometimes escapes younger children it may well be the feature which attracts and holds the attention of an older child who may need the additional practice on the curriculum. But when the humor is very sophisticated, we make every effort to include visual humor simultaneously in order to hold the interest of the young child.

11. What is the reason for so many different dialects on the show?

A. In presenting many varieties of English, CTW is following the best advice of contemporary linguists, namely to present many different ways of speaking in contexts where those language varieties are appropriate. Print appearing on the screen, however, follows standard English orthography. It should be noted that actors who speak a non-standard variant in one situation also speak standard English in others, where it is appropriate. This is our way of acknowledging that people speak in different ways and these are all acceptable in different situations, but no matter how any one of us sounds when we speak, we all read the same printed forms.

12. Is the program effective with children in grades higher than, say, the third and fourth grade?

A. Most of the information we have is informal, but we know that the show is being used with older children and even in some adult literacy programs. Those using it report that it is helpful.

13. How often per week do children need to view the program in order to benefit from it?

A. According to the Herriott-Liebert survey, many schools could not rearrange their schedules to permit classes to view five days a week, so the average viewing time per child totaled about four days a week. The gains reported by Educational Testing Service are for children who view the show regularly in school. We do not at this point know what the effects are with less frequent viewing. However, the shows are not sequential, and so are not dependent upon one another. Missing a show does not affect understanding the next show.

14. Is school viewing advised in preference to home viewing?

A. We are not yet certain what the educational effects of the program are in the home viewing situation. We have a much better idea of the show's effectiveness in the classroom. Obviously, home viewing isn't as dependable a way of presenting the program as when it is part of the regularly daily classroom schedule.

15. If some members of my class have viewed the program for a year or more already, is there any value in their continuing to view it for a second or even a third season?

A. This question can be answered only over time. We are now in our second broadcast season, and ETS is carrying out a study to find out what happens to children who view two consecutive seasons as opposed to those who view only one season at various grade levels (first, second, or third).

16. How useful are teacher initiated activities centering around the program? Are some more useful than others?

A. We have also initiated research to try to answer this question. The Electric Company has only been in the classroom for a little more than a year so our best information naturally comes from the teachers who are experimenting with ways to use it. The Herriott-Liebert study reports that over 80% of the teachers surveyed felt that discussion prior to the broadcast helps their students catch the message of the program. Over 90 percent consider it useful to hold discussions of the program immediately afterward. Interestingly, a little more than 60 percent of the teachers said that discussion *during* the viewing time was helpful.

17. Is The Electric Company curriculum a comprehensive reading program?

A. No. The Electric Company is purposely designed as a supplement, an additional reading resource for the teacher and the child. It may enhance, but cannot replace, an integrated program of reading instruction.

18. What viewing conditions should be maintained in the classroom?

A. There are some conditions that would seem to be important. The television set should be placed in such a way as to eliminate glare from lights or windows and viewing groups should be organized and the children situated so as to permit each child to see print on the screen clearly. The most common practice is that of having all children in the classroom view the show but if some children are watching the program and other children are engaged in other activities, these activities should not be noisy or distracting.

19. Are children who are watching The Electric Company on black and white sets in schools at a disadvantage in comparison to children who watch it on color sets?

A. Apparently not, at least not from the point of view of learning. The reading achievement gains demonstrated by both groups on the ETS tests were similar.

20. How can I, as a teacher, offer suggestions or criticisms regarding The Electric Company?

A. The Workshop welcomes your responses to the program. You can write to us at any time, c/o Electric Company Research, Children's Television Workshop, 1 Lincoln Plaza, New York, N.Y. 10023.

ECA F

APPENDIX V

LEVEL: ELEMENTARY
PROGRAM: ACADEMIC

NATIONAL AVERAGE
COST-ED ECONOMIC FACTOR RANKING
EDUCATION TURNKEY SYSTEMS

DATE: 09/20/71

RANK OF 25	DATA GROUP	COST FACTOR	REFER.	COST FACTOR VALUE FOR CHANGE IN COST PER STUDENT YEAR: 1% SAVINGS	INITIAL VALUE	1% ADDL COST	COST IMPACT RELATION		RELATIVE POWER
1	INSTRUCTION	STAFF RATIO	TEACHR	[illegible]	[illegible]	[illegible]	NEG	ACC	100
2	CLASSROOM TEACHR	ANNUAL SALARY		8930.1758 $	9025.0000 $	9219.8203 $	POS	LIN	95
3	CLASSROOM	PEAK USE %		93.1856 %	100.0000 %	106.8144 %	POS	LIN	30
4	CLASSROOM	RAW UNIT RQMTS		30.4779 UNIT	33.0070 UNIT	35.5361 UNIT	POS	LIN	27
5	CLASSROOM	UNIT ACQ COST		18.9630 $	20.6100 $	22.2570 $	POS	LIN	26
6	STUDENT FLOW	DROPOUT RATE		0.0431 %	1.0300 %	1.9709 %	POS	ACC	22
7	PRINCIPAL&STAFF	ANNUAL SALARY		28700.0000 $	31673.6992 $	34647.3945 $	POS	LIN	22
8	CLASSROOM	USEFUL LIFE		56.0187 YRS	50.0000 YRS	45.1495 YRS	NEG	ACC	21
9	CLASSROOM	OVERHEAD %		54.6237 %	62.5450 %	70.4662 %	POS	LIN	16
10	CLASSROOM	BOND MATURITY		17.1317 YRS	20.0000 YRS	22.8683 YRS	POS	LIN	14
10	CLASSROOM	INTEREST RATE		5.4307 %	6.3400 %	7.2492 %	POS	LIN	14
12	INSTRUCTION	COMP FACTOR 1	TEACHR	0.1703	0.2005	0.2307	POS	LIN	14
13	CLASSROOM	OP COST/UNIT-DAY		0.0027 $	0.0033 $	0.0039 $	POS	LIN	12
14	CLASSROOM TEACHR	FRINGE RATE		6.3534 %	8.7000 %	11.0466 %	POS	LIN	8
15	CLASSROOM	MAINT COST/$-YR		0.0122 $	0.0171 $	0.0220 $	POS	LIN	7
16	DIST.ADMIN.STAFF	ANNUAL SALARY		42930.1797 $	51884.8398 $	80839.5000 $	POS	LIN	7
17	MULTIPURPOSE RM.	RAW UNIT RQMTS		3.3369 UNIT	5.8680 UNIT	8.3971 UNIT	POS	LIN	5
18	INSTRUCTION	OTHER HOUR COST	TOTALS	0.0104 $	0.0199 $	0.0294 $	POS	LIN	4
19	PRINCIPAL'S AREA	RAW UNIT RQMTS		2.4830 UNIT	5.0120 UNIT	7.5410 UNIT	POS	LIN	4
20	CLASSROOM FURN.	RAW UNIT RQMTS		22.6972 UNIT	59.0800 UNIT	95.4628 UNIT	POS	LIN	3
21	INSTRUCTION	BK-AV HOUR COST	TOTALS	0.0023 $	0.0118 $	0.0213 $	POS	LIN	3
22	INSTRUCTNL.EQPT.	RAW UNIT RQMTS		[illegible]	[illegible]	[illegible]	POS	LIN	2
23	KITCHEN	RAW UNIT RQMTS		LOW	2.2670 UNIT	4.7960 UNIT	POS	LIN	2
24	KITCHEN	USEFUL LIFE		HIGH	50.0000 YRS	15.4312 YRS	NEG	ACC	1
25	DIST.ADMIN. AREA	RAW UNIT RQMTS		LOW	2.1500 UNIT	6.7519 UNIT	POS	LIN	1

Note: This is an abbreviated Economic Factor Ranking, for display purposes. Rankings for most instructional programs contain between 100 and 300 key cost factors.

Education Turnkey Systems, "The COST-ED Model: A New Economic Tool for the School Administrator," Washington, D. C.: Education Turnkey Systems, 1600 L Street, N. W., 1971. (Mimeographed)